

INCREASING PHYSICAL ACTIVITY LEVELS AMONG GIRLS IN RUSSIA: A CROSS-
OVER TRIAL

by

NATALIE J. UPDYKE

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Major Professor
Richard R. Rosenkranz

Abstract

Background: Children who obtain insufficient physical activity (PA) have increased risk for chronic diseases. From childhood to adolescence, there is typically a decline in overall PA, with a more rapid decline in girls, at a younger age. The objective of this study was to determine the impact of two types of organized PA instructional conditions (structured no-choice, structured choice) on girls' PA levels, as compared to free-play at a summer camp in Russia. We hypothesized that free-play would elicit the highest levels of PA.

Methods: This study used a within-subjects cross-over trial design. Thirty-two girls (aged 10.7 ± 0.6 yr; BMI percentile $47 \pm 31\%$) at a Russian summer camp, attended daily 35-minute PA sessions for three weeks. Using the evidence-based Coordinated Approach to Child Health physical activity box, three PA instructional conditions (structured choice, structured no-choice, free-play) were implemented each day. Actical PA monitors collected step count and PA intensity data. Mixed model ANOVAs were used to assess differences in step counts and percentage of time in Moderate to Vigorous Physical Activity (MVPA) by instructional condition.

Results: Twenty-five of the 32 participants attended all sessions, and 31 attended at least two of three sessions for each condition. Both structured conditions, no-choice steps/min (mean= 42.7 steps/min; 95%CI= 39.6–45.7; $p= 0.0003$) and choice condition steps/min (mean= 41.0 steps/min; 95%CI= 37.9–44.1; $p= 0.004$) were significantly higher than free-play steps/min (mean= 33.4 steps/min; 95%CI= 30.2–36.5). Percent time in MVPA was higher in the no-choice condition (mean= 30.9%; 95%CI= 28.1–33.8; $p<0.0001$) and choice condition (mean= 30.8%; 95%CI= 27.9–33.7; $p< 0.0001$) when compared to free-play (mean= 21.2 steps/min; 95%CI=

18.2–24.1). There was no difference in steps/min or percentage time in MVPA between both structured conditions.

Conclusion: Both types of instruction were superior to free-play with regard to PA level.

Although contrary to our hypothesis, our results fit with previous literature that suggests evidence-based instructional interventions can promote higher PA levels in physical education sessions. Our results suggest that well-planned, stimulating PA sessions can increase short-term PA levels in girls compared to free-play opportunities in a Russian summer camp setting.

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Chapter 1 - Literature Review

Introduction

Current Overweight and Obesity Status

As of 2014, the current worldwide population of adults 18 and over, 39% are overweight or obese and 13% are classified as obese (CDC, 2014). The United States tops these rates with 68% of the adult population over 20 years old being classified as overweight or obese, and 34.9% classified as obese. The overweight and obesity prevalence of American youth is startlingly high at 31.8%, of which 16.9% are classified as obese (Ogden, Carroll, Kit, & Flegal, 2014). The rising overweight and obesity trend is also affecting Russia. The Russian adult population obesity rate has doubled since the mid-nineties to 22% and the overweight/obese prevalence is estimated to be 58% (Shukla, Kumar, & Singh, 2014). This increase in adult overweight and obesity morbidity may be associated with the higher prevalence of hypertension, angina, stroke, and diabetes in Russia compared to other developed countries such as China and India, according to data from the World Health Organization study on global aging and adult health (Shukla, Kumar, & Singh, 2014). Besides the health benefits, people and their government should be interested in reducing the world's overweight/obesity morbidity due to financial reasons. According to the WHO Report, 2005 regarding the economic impact of chronic disease, Russia loses \$11 billion annually to obesity-related chronic diseases: diabetes heart, disease, and stroke, which contribute to making obesity the fifth leading risk for death in the world (Shukla, Kumar, & Singh, 2014).

Another major concern is the rate at which childhood overweight/obesity prevalence is rising in Russia. Where the Russian prevalence in eleven year olds, 25% (Currie et al., 2012), is much lower than the American childhood prevalence of 39% (WHO, 2012), this is concerning

due to the rate at which Russian children are becoming obese. Where the prevalence among US youth may be stabilizing, the NHANES data showed no significant changes in obesity prevalence from the 2003-2004 study to the 2011-2012 study (Odgen et al., 2014), the rate in Russia is still increasing. The Russian Ministry of Healthcare reports obesity incidence for children 0-14 years old as 1060.3 per 100,000 and for teenagers 15-19 years old the incidence is 2289.3 per 100,000 (The Russian Federation Ministry of Healthcare, 2013). The proportion more than doubles by as late adolescence which may cause Russia's childhood obesity prevalence to reach levels equal to America if the trend continues.

Another concern regarding obesity prevalence in Russia is the sex inequality. Where the obesity prevalence in The U.S. is relatively similar between sexes (30.2% of men and 33.2% of women), there is a large difference between sexes in Russia (18.4% of men and 29.8% of women) (WHO, 2014). This is particularly concerning since girls have less than half the prevalence of overweight and obesity compared to boys up until their early teens. Girls 13 years of age have an overweight prevalence of 9% compared to boys which have a prevalence at 22%. Where boys and men have relatively the same proportion of overweight and obese individuals, the proportion of overweight and obese women grows to three times the prevalence in girls 13 years of age. Targeting girls for obesity intervention at a young age could be of particular importance for reducing the significant increase in weight gain that is currently occurring in Russian women.

Adverse Outcomes

Being overweight or obese increases risks of CVD, diabetes, musculoskeletal disorders, and some cancers: endometrial, breast, colon (WHO, 2015). These health outcomes are not limited to adults. Overweight children have increased risk of fractures, hypertension, early

markers of cardiovascular disease, insulin resistance, and increased breathing difficulty (Waters et al., 2013; WHO, 2015). Obesity, although it affects physical health, it also is responsible for negatively effecting social and psychological outcomes. Overweight and obese children have increased risk of sadness, loneliness, and nervousness, and are more likely to be involved in negative health behaviors such as smoking and alcohol (Strauss, 2000). Of particular significance to this study, Strauss et al. reports that those particularly susceptible to low self-esteem due to being classified as overweight/obese are adolescent white girls (Strauss, 2000). Overweight children may be inflicted with a disproportionate amount of teasing and bullying due to their weight, but this group is also susceptible to facing negative social prejudices. In a study examining perception of body types, even children as young as nine identified overweight people as unclean, lazy, and of low intelligence (Hill & Silver, 1995).

Importance of PA Intervention

Overweight and obesity, which were once considered to be problematic only for adults in developed, high income countries, now effect a majority of the world. Over the past 30 years the worldwide obesity prevalence has doubled, with and low- and middle- income countries reporting increased overweight and obesity trends (Popkin, 2004). These trends are especially concerning in children since the World Health Organization (WHO) reports the rate of increase of overweight and obese children in developing countries is more than 30% higher than that of developed countries (WHO, 2015). The worldwide rise in childhood obesity brings particular attention to the need for more upstream approaches. Primary prevention is especially important for youth since evidence shows that obese children are more likely to become obese adults (Flynn et al., 2006; Goran, Reynolds, & Lindquist, 1999; Guo & Chumlea, 1999; Singh, Mulder,

Twisk, van Mechelen, & Chinapaw, 2008; Waters et al., 2011), and once children are obese, they tend to track within that weight classification (Singh et al., 2008)

Overweight and obesity interventions focus on shifting the energy balance to having less energy intake than energy expended. This is primarily done by two methods, modifications to energy intake and modifications to physical activity levels. However, dietary restriction alone may not be the best practice in child weight interventions because energy restriction in children has been shown to harm normal growth and development, as well as introduce a greater potential for developing an eating disorder (Dietz, 1985, Flynn et al., 2006; Goran et al., 1999). Many children are not currently meeting physical activity guidelines and this could be contributing to increased weight gain (Troiano et al., 2008; Physical Activity Guidelines Advisory Committee, 2008). Focusing on physical activity for potential interventions in children and adolescents could help encourage weight management without harming growth and development or encouraging unhealthy eating behaviors to develop.

Physical Activity

Across the globe, physical inactivity is increasing while levels of higher intensity, moderate to vigorous activity (MVPA) is decreasing (Hallal, 2012). Across the world, 1 in 4 adults are not sufficiently active and 80 percent of children don't meet PA guidelines (WHO, 2010). The current guidelines recommend children and adolescents be moderately to vigorously active at least 60 minutes per day and be vigorously active for at least 3 days per week (Physical Activity Guidelines Advisory Committee, 2008). However, the current guidelines are only being met by 42% of American children age 6-11, 8% ages 12-15, and only 7.6% ages 16-19 according to Troiano and colleagues (Troiano et al., 2008). On the world scene this is concerning because lack of physical activity is associated with increased risk for many non-communicable diseases:

cardiovascular disease, diabetes, and cancer, as well as risk factors: overweight, elevated blood pressure, and elevated blood sugar (Hallal, 2012). These associations contribute to physical inactivity being identified by the WHO as the fourth leading risk factor for global mortality (WHO, 2010).

Physical Activity Drop-off

Adolescents' physical activity levels drop off from levels observed in early childhood (Troiano et al., 2008; Physical Activity Guidelines Advisory Committee, 2008). This drop in physical activity not only increases a child's risk of being overweight or obese, but increases risk for many other negative health outcomes. The biggest difference across age groups is between children age 6-11 and 12-15 year olds. Adolescents age 12-15 accumulate one-third as much moderate to vigorous activity as 6-11 year olds (Troiano et al., 2008). Vigorous activity is very low in late adolescence where only three minutes or less of vigorous activity is observed in those 16 years old (Troiano et al. 2008). This is significant difference from the 10-16 minutes obtained in early childhood.

The best predictor of adult physical activity is persistent intensive physical activity and participation in organized sports regardless of type of sport, during childhood (Telama, 2009). In the Muscatine tracking study, girls who were in the higher activity level tertiles of physical activity in young childhood tended to remain in their respective tertile in follow-ups (Janz Dawson, & Mahoney, 2000). Physical activity and physical fitness has also been shown to track similarly into adulthood (Janz et al., 2000). This may be partially attributed to the habit formation hypothesis; people repeat some behavior because it is a habit. Children who are introduced early to regular, intensive physical activity are more likely to develop motor skills, athletic abilities, attitudes, and motivation to be physical active (Telama, 2009). This could help

explain why activity levels in more active children track to an adulthood; they have formed habits and skills needed to be physically active as adults. Overweight and obese adolescent children are at higher risk of become overweight and obese adults (Guo & Chumlea, 1999, Sing et al. 2008), so interventions targeting children at a young age, are of particular importance to prevent overweight and obesity prevalence in adults.

Health Benefits of Physical Activity

Research has shown that regular physical activity can be helpful in regulating body weight, increased cardiorespiratory fitness and muscular strength, favorable body composition, increased cardiovascular and metabolic health, bone health and improved mental health. Besides positive weight regulation benefits of PA, being physically active can be protective against chronic disease risk factors for heart disease, hypertension, type 2 diabetes, and osteoporosis (Physical Activity Guidelines Advisory Committee, 2008). Being physically active also decreases risk of death. People who are not regularly physically active are also 20-30% greater risk of death compared to those that are physically active (WHO 2010).

Although physical activity is generally associated with physical well-being, it also plays a role in lifestyle patterns and psychosocial health. Physical activity can have positive effects on health behaviors like smoking, diet, drug use, and sexual activity (Goran et al., 1999). The CDC's 2008 Physical Activity Guidelines Advisory Committee reports that more additional health benefits are observed as physical activity increases through higher intensity, greater frequency, and/or longer duration. This highlights the importance of not only being more physically active throughout the day, but also to be more intensely active.

In addition to benefits of physical activity, physical fitness has also been shown to be protective in both adolescents and adults (Janz, Dawson, & Mahoney, 2002; Twisk et al., 2002).

Physical fitness during youth is associated with protection against CVD risk later in life (Twisk et al., 2002), and improvements in two components of physical fitness (aerobic fitness and muscular strength) during childhood are beneficial for systolic BP and lipid outcomes in adolescence (Janz et al., 2002). Results from Twisk et al. (2002) and Janz et al. (2002) also indicate that maintaining high levels of aerobic fitness and muscular strength during late childhood, is associated with lower levels of abdominal adiposity later in life. Therefore, interventions targeting increasing PA and physical fitness could be beneficial in reducing and preventing obesity in both children and adults.

Sex Differences

While PA guideline adherence drops across both sexes as children age, girls are less active overall, and are less likely to meet PA guidelines than boys (Janz et al., 2000; Nader et al., 2008; Troiano et al., 2011; Trost et al., 1996). The differences in PA levels between sexes start at a young age. Only 35% of girls aged 6-11 meet PA guidelines where 48% of boys 6-11 obtain at least 60 minutes of recommended PA per day. The gap widens in adolescence with 12% of boys meeting guidelines and only 3.4% of girls (Troiano et al., 2008). In a longitudinal study conducted by Nader et al., following a cohort from age 9 to age 15 years of age, similar sex differences were observed. Girls in the study dropped below the recommended 60 minutes of MVPA at approximately 13.1 years of age, and boys dropped below the recommendations at 14.7 years of age (Nader et al., 2008). Girls are particularly at risk of low physical activity, both in PA duration and intensity, and levels are shown to start declining in early adolescence. Positive health benefits may be gained from interventions that attempt to attenuate the physical activity decline, even without an increase in physical activity level (Dumith, Gigante, Domingues, & Kohl, 2011).

Fitness levels and intensity of PA are also lower in girls than boys. Boys have been shown to increase vigorous activity from late childhood to age 14, whereas girl's activity either stays the same or drops slightly (Janz et al., 2000; Nader et al., 2008). Boys' VO₂ (cardiorespiratory endurance) has been shown to normalize with body size as they age, but girls VO₂ has been shown to decrease. The difference between cardiorespiratory endurance, a measure of physical fitness, between boys and girls was also depicted in the Muscatine study by the follow up mile times. Where boys continued to improve their mile times from age 9 to age 14, girls times started to slow once they reached approximately 14 years of age (Janz et al., 2000). When girls reduce their vigorous activity, they are limiting their cardiorespiratory endurance as well as the potential health benefits that higher intensity activity can elicit.

Interventions

Children are a particularly important group for PA intervention because there is the potential for them to develop lifelong healthful habits that track into adulthood. In a systematic review by Singh et al. (2008) all studies reported an increased risk in overweight or obese youth for becoming overweight or obese adults. The authors recommend targeting intervention efforts especially among high-risk groups. In Russia's case, young girls may be a good target group for interventions since reducing the prevalence of overweight and obesity in girls may prevent the significant difference between overweight and obesity prevalence in men and women later in life.

Research supports that schools are a critical setting for positively impacting health status indicators such as body compositions, chronic disease risk factors and fitness (Flynn 2006). In a Cochrane review of obesity interventions in children, the review recommended school curriculum that includes physical activity, as well as increasing number of sessions for physical

activity and the development of fundamental movement skills throughout the school week (Waters 2013). The school setting is also similar to a Russian summer camp setting in that there are designated daily classes, PE, and recess sessions scheduled throughout a majority of the day. Children spend a majority of their day at school or at camp in Russia during the summer, making PE and recess time denoted for physical activity a prime opportunity for children to work towards World Health Organization's global PA guidelines of 60 min of MVPA per day.

Since physical activity levels drop across childhood and adolescences, effective interventions may be those that attempt to attenuate the physical activity decline, even without an increase in physical activity level (Dumith et al. 2011). Providing environments tailored to girls that provide enjoyable opportunities for MVPA, could be beneficial in reaching activity guidelines and preventing overweight and obesity. Where interventions targeted at improving long term PA behaviors would elicit the most health benefits, research as shown that improvements to health outcomes has been shown in a summer camp PA intervention as short as 4 to 8 weeks. Significant improvements to resting heart rate, arterial pressure, and peak oxygen consumption have been shown in a summer camp setting where the intervention group was exposed to supervised play-based physical activity (Meucci et al., 2013), similar to the present study.

Research has shown that free play conditions often elicit the highest levels of physical activity (Beets, Weaver, Beighle, Webster, & Pate, 2013; Trost, Rosenkranz, & Dzewaltowski, 2008,) but interventions that provide guidance and structure for children to be physically active have also been shown to increase PA during recess periods (Chin & Ludwig 2013, Huberty et al., 2011; Verstraete, Cardon, De Clercq, Dirk, & De Bourdeaudhuij 2006). Previous studies also

indicate that providing choice in PA sessions may have a significant impact on PA levels in children (Chin & Ludwig, 2013; Lonsdale et al., 2013).

Conclusion

Physical activity is beneficial for physical, mental, and social wellbeing, and increasing levels of physical activity has the potential to attenuate or prevent the onset of many chronic diseases as well as reducing the risk for negative health outcomes or symptoms of those already diagnosed with a chronic disease. Physical activity can also play a key role in improving or stalling the progression of overweight/obesity morbidity in both adults and children. Maintaining the higher physical activity levels observed in children through later adolescence and adulthood, has the potential to improve the overall health globally. This is particularly important for young girls, whom as compared to boys, experience earlier and greater drop-off in physical activity levels during adolescence. Physical activity as well as sedentary behavior has been shown to track into adulthood, and those that are more active as children and teenagers are more likely be more active as adults. By attenuating the drop off in physical activity in adolescence, girls may have greater potential for maintaining a healthy weight.

There is currently a gap in knowledge regarding how to encourage girls to be more physically active as they age through adolescence. Further investigations need to be done to determine the best practice for facilitating greater levels of high intensity PA in girls as well as determine motivators for PA. The current study aims to investigate what instructional conditions will encourage Russian girls to accumulate the most MVPA in a summer camp PA session, and secondarily, aims to investigate what motivates Russian girls' choices to be physically active.

Chapter 2 - Methods

Setting

The study was conducted at a live-at Russian summer camp, Yantar, in the forested Vologda Region of Russia along the Yantar River. Children attended the camp in sessions lasting 21 days where they were required to remain on the Yantar campus for the duration of the camp. The camp hosted up to 600 children during a session of the camp, and children were divided up into teams of about 35 campers of the same gender. Each team was assigned a teacher and two counselors that supervised the group throughout the entirety of the camp session. The camp's gym and activity field were used for the activity sessions. The activity field was a flat grassy field about the size of a soccer field that was used for running games and soccer sessions. The gym, containing one standard sized basketball court, was used for basketball sessions as well as sessions when the weather would not allow for outdoor activity.

Participants

The participants in the study were 32 healthy Russian girls between the ages of 9-12 (Mean = 10.7, SD = 0.6 yrs.) who were all members of the same team at the camp. All participants in the study were asthma free and didn't have limitations on their ability to be physically active. Before entering the study, all participants, as well as each girl's parent(s), returned written informed consent forms that had been distributed by the camp office. Prior to participation, each girl's parent also filled out surveys providing demographic information about their child and family. All of the girls were of Russian descent and their primary language was Russian. The experimental protocol for this study was approved by the Institutional Review Board at Kansas State University in Manhattan, KS.

Experimental Design

Prior to the start of the 3-week camp session, the camp administration selected one team of girls, with signed parent and child consent forms, to be designated as the study participant team. The camp administration and staff were not informed of the details of the study beyond the fact it was a physical activity education study that would require daily participation in activity sessions. On the first day of the camp (July 20, 2014) the team of girls designated as study participants reported to the camp hospital for baseline assessments. Here, anthropometric measurements of each girl were taken privately by two trained research assistants. The measures taken were height, weight, and waist circumference. While waiting to be measured, each girl filled out a baseline questionnaire pertaining to their attitudes toward physical activity and their self-efficacy related to PA.

After the initial assessment, girls started attending daily 35 minute PA activity sessions Monday-Friday, five days a week. Using the evidence-based Coordinated Approach to Child Health (CATCH) physical activity box, each day a different type of PA instructional condition (alternating structured choice, structured no-choice, free-play) was implemented. A trained research advisor, along with the assistance of two counselors/interpreters monitored and oversaw daily activity sessions. Each week also had a theme for the games played: soccer, CATCH games, and basketball. Monday and Tuesday were used to teach the girls the new games and practice the physical skills that would be used in that week's games. As explained in the sections to follow, the primary outcome measure (physical activity) data were collected on Wednesday, Thursday, and Friday and following each of these sessions, post-activity questionnaires were administered to collect secondary outcome measures regarding PA motivation, autonomy, relatedness, and competence.

Instructional Conditions

During each daily activity session, the girls were exposed to the same instructional condition throughout the whole day's session. On the free play day, girls were instructed to play openly however they would like throughout the 35 minute session. No instruction was provided regarding what type of activity the girls should play, but they were encouraged to be active. Equipment (volleyballs, basketballs, soccer balls, Frisbees, footballs, hula hoops) were placed out and available for use during free play sessions, similar to conditions in previous studies where high levels of PA were reported in free-play conditions (Troost et al., 2008). For structured choice and structured no-choice days, a grid formation of six separate designated spaces was utilized. Each space was clearly marked with cones and represented a separate game. Each space had to have a minimum of 4 girls and maximum of six. Three different games were played throughout the six squares of the grid, two squares being designated for each game. The grid formation is depicted below in Figure 2.1. During choice days, girls were instructed to play three different games throughout the activity session, each game lasting 8.5 minutes. When time was called, girls were instructed to relocate to a different square on the grid, and begin a new game. The girls were allowed to choose to play the same game, but they were required to move to the other square that that particular game was being played. During instructed no-choice days, girls were instructed to play three different games sequentially throughout the day's session. When time was called, girls were instructed to rotate to the next game.

Figure 2.1 Activity Grid for Structured Choice and Structured No-Choice Days

A	C
B	A
C	B

Three Games

A. Game 1

B. Game 2

C. Game 3

**When time was called participants switched
to a new square to start a new game**

Latin Square Cross-Over Design

A cross-over design was utilized so every participant was exposed to each instructional condition (choice, structured no-choice, and free play). This allowed for comparison of instructional condition effect on each individual participant as well as comparisons between participants under each condition. The Latin Square design was utilized in designing the weekly schedule to control for an order or week effect on the outcomes. Each week the order of the instructional condition was reordered prevent outcome bias due to the order and day of the week each condition was administered. The Latin Square design in this study is outlined in bolded box in table 2.1.

Table 2.1 Weekly Schedule Breakdown

	Monday	Tuesday	Wednesday	Thursday	Friday
Soccer Week 1	Intro to Soccer Skills and Games	Practice Activities	A	B	C
CATCH Games Week 2	Intro to Games	Practice Games	B	C	A
Basketball Week 3	Intro to Basketball Skills and Games	Practice Activities	C	A	B

A= Choice of Activity B= Structured No-Choice C= Free Play

Questionnaires and Measurements

Anthropometric Measurements

Prior to the commencement of the first physical activity session, a trained research assistant acquired all anthropometric measurements in a private room of the camp hospital. Prior to being measured each girl was asked to remove her shoes and any thick, heavy clothing or jackets. The girl's weight was then measured on a digital scale (VEM-150 (A3), Massa-K, Saint Petersburg, Russia) to the nearest 0.1kg.; height was measured to the nearest 0.1cm using a stadiometer (RM-1-"Diakoms", Moscow, Russia); waist circumference was measured with a non-elastic tape measure in cm to the nearest 0.1cm. The waist circumference measurement was obtained after giving the girls the instruction to place their arms across their chest in an "x" formation, placing their hands on top of their shoulders, and take a deep breath. The trained research assistant took a measurement around their abdomen on a horizontal plane between the girl's belly button and iliac crest while the girl was exhaling a deep breath. Height, weight, and waist circumference were measured three times for each girl, and the average was used for data analyses.

BMI was calculated by dividing body weight in kg by height in m². The Centers for Disease Control and Prevention's (CDC) age- and sex-specific growth charts were utilized to convert each girl's BMI to a percentile (Kuczmarski et al., 2000). This percentile was used to classify each participant as obese, overweight, normal, or underweight. The CDC defines obese as at or above the 95th percentile of BMI for age and sex; and overweight as between 85th to 95th percentile of BMI for age and sex.

Physical Activity

Physical activity was objectively measured with Actical accelerometers (Respironics Inc., Bend, OR, USA) on Wednesday-Friday each week. Girls wore the accelerometers on a locking belt that allowed the Acticals to be placed and worn on the right hip. Actical have been validated for measures of moderate to vigorous PA, as well as step counts (Heil, 2006; Rosenkranz, Rosenkranz, & Weber, 2011). The devices were programmed to record step and activity count data in 15 sec epochs. Cut points for physical activity intensity were: sedentary/inactive <25 counts/minute, light 25 to <375 counts/minute, moderate 375 to <1625 counts/minute, and vigorous ≥ 1625 counts/minute (Puyau, 2002).

The monitors were distributed to the participants, and the identification number and name of the participant were recorded to ensure the girl received the same monitor each day. Each day the girls would retrieve their designated monitor and attach the belts around their waist. A research assistant would then confirm that the monitors were right side up and positioned on each participants right hip. The time at which PA started was recorded at the beginning of each PA session as well as the ending time for each session. Participants then removed their belts and returned the devices at the end of each day's session. Data from days 3-5 of each week were used to assess the intervention condition administered on each day. The time used for analysis was the time from the start of play until the end of the session. On days that the weather altered the overall session PA time (1 day intense heat required the girls to take water breaks and another day rain required session relocation), the time spent not in PA games was removed from the data prior to analysis.

Questionnaires

Prior to commencement of physical activity sessions, girls filled out questionnaires regarding their PA self-efficacy as well as their attitudes towards PA, PA enjoyment. These same two questionnaires were also filled out by each girl after the last PA session of the study, on Friday of week three. The questionnaires were made up of multiple scales: PA self-efficacy was assessed using a previously validated questionnaire with five scaled questions that were informed by the Social Cognitive Theory (Dzewaltowski, Geller, Rosenkranz, Karteroliotis, 2010). The questionnaire measuring PA enjoyment utilized a previously validated scale (Dishman et al., 2009) made up of seven negatively worded questions to quantify PA enjoyment. The PA enjoyment scale has been shown to have acceptable test-retest stability (Chronbach's alpha – 0.73) (Dishman et al., 2009).

Following each of the nine activity sessions where PA was measured, questionnaires assessing PA motivation during that days PA session, were given to the girls to fill out in a classroom setting. The questionnaires were administered by the team's teacher and two camp counselors whom were available to answer questions when necessary. All questions accessing PA motivators were rated on a 7-point Likert scale ranging from 1, not at all true, to 7, very true. The first part of the questionnaire was to measure the girls' autonomy, competence, and relatedness (Standage, Duda, J., & Ntoumanis, 2005). For the second part of the questionnaire the girls filled out the Situational Motivation Scale (SIMS) (Guay, Vallerand, & Blanchard, 2000) which contains subscales regarding motivation, external regulation, identified regulation, and intrinsic motivation. From these subscale summary scores, a self-determination index (SDI) score could be calculated ($SDI = 2 * \text{intrinsic motivation} + \text{identified regulation} - \text{external regulation} - 2 * \text{motivation}$) (Lemyre, 2006). Scores on SIMS provide a quantitative measure of motivations for participating in PA sessions. SDI values can range from -18 to +18, and higher

scores indicate a greater self-determined motivations towards a situation. The reliability and validity of SIMS have been supported in previous studies in the literature (Guay et al., 2000; Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009).

Statistical Analyses

SPSS v. 22.0 (IBM Corp., Armonk, NY) was used for statistical analyses of participant descriptive statistics, PA enjoyment, and PA self-efficacy. PA self-efficacy and enjoyment mean scores were calculated and paired t-tests were performed to test whether there were significant differences from baseline to post-intervention. The descriptive statistics were reported as mean values with corresponding standard deviations (Table 3.1). SPSS was also used to run a one-way repeated measures ANOVA with a Bonferroni correction ($\alpha = 0.05$) to account for multiple comparisons for analyses of the SIMS questionnaire data as well as questionnaire data related to autonomy, competence, and relatedness. SAS 9.4 (SAS Inst., Cary, NC) was used to run a mixed model (proc mixed) repeated measures analysis of variance with a Bonferroni correction ($\alpha = 0.05$) to determine differences in step counts and percentage of time in MVPA by instructional condition. Proc mixed analysis was also utilized to control for covariates: instructional condition, week, sport, and age of participant. In order for a participant to be included in data analysis for each instructional condition, the participant needed to attend at least two full PA sessions for that particular instructional condition. Data were tested for normality and parametric assumptions were met, and statistical significance was set at $p < 0.05$ for all statistical tests.

Chapter 3 - Results

Participant Characteristics

Baseline participant descriptive statistics are reported in Table 3.1. The study participants were 32 girls, and a majority of the girls were at a healthy weight based on the CDC's age and gender specific growth charts ($n=25$). One girl in the study was classified as underweight and 6 girls were classified as overweight/obese. All of the girls were Caucasian, and Russian was the primary language spoken in the home. A majority of the girls primary parent had graduated from college ($n=23$), two had attended some college, and 7 had graduated from high school. Also reported on the parent's survey were estimations of their child's regular MVPA behavior. Parents reported their children were typically physically active for at least 60 minutes per day for an average of 4 (mean= 4.1, $SD \pm 1.3$) days per week. Of the 32 participants, 25 attended all sessions, and 31 girls attended at least two of the three sessions for each condition. No participant missed more than two sessions in total.

Table 3.1 Baseline participant characteristics

	Descriptive Statistics			
	Mean	Minimum	Maximum	Std. Deviation
Age (years)	10.7	9.0	12.0	0.7
Weight (kg)	39.7	25.5	70.4	10.6
Height (cm)	147.1	132.8	159.7	7.1
Waist Circumference (cm)	70.7	56.5	99.4	11.1
CDC BMI (kg/m^2)	18.1	14.5	28.2	3.5
CDC BMI Percentile	47.0	4.0	97.0	30.5

Self-Report # of Days of MVPA in Last 7 Days	5.3	2.0	7.0	1.3
Self-Report # of Days of MVPA in Typical Week	4.1	2.0	7.0	1.5

Physical Activity

Steps per Minute

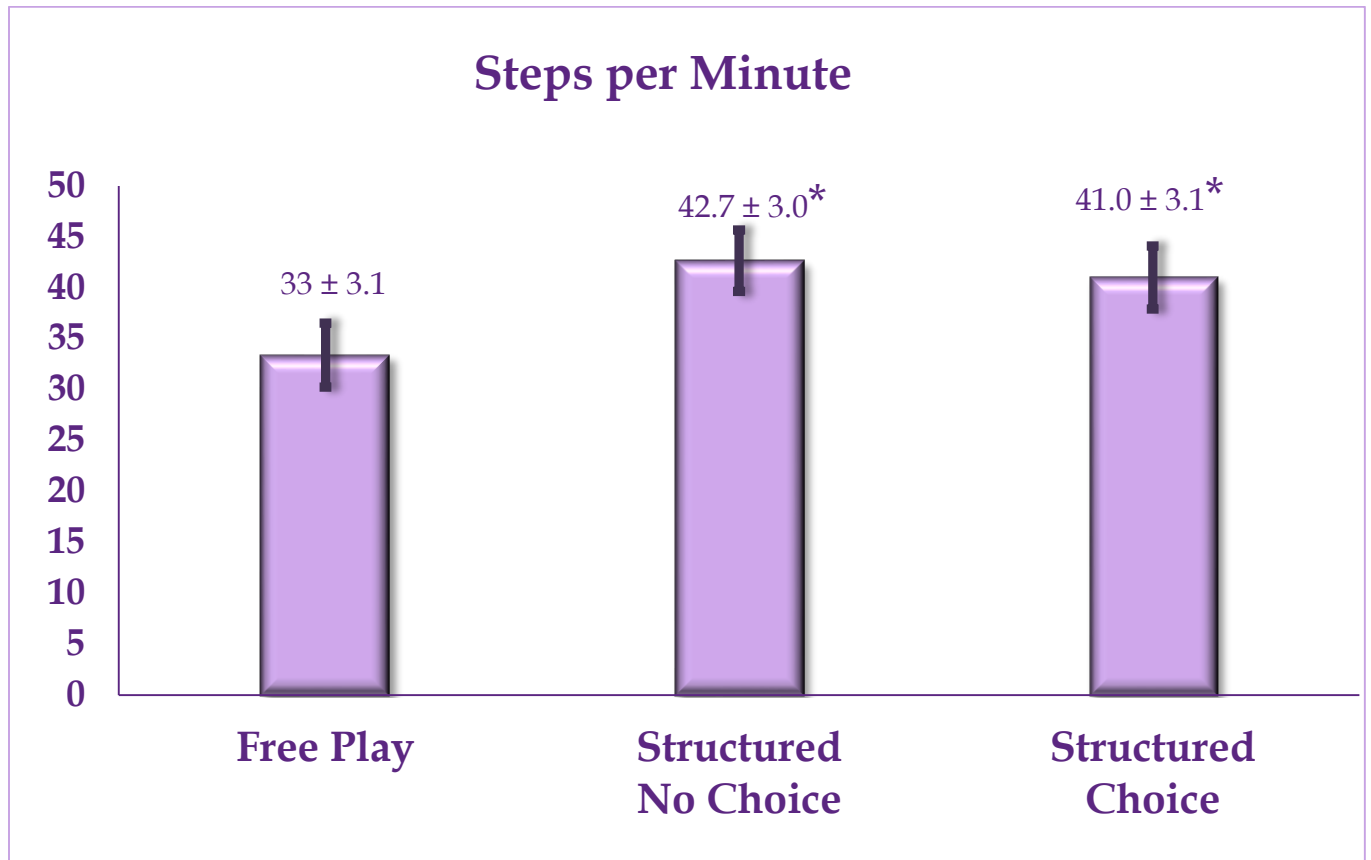
The differences in steps per minute between the instructional conditions can be found in Figure 3.1 and Table 3.2. The highest value for steps per minute during a PA session was observed in the structured no-choice condition (mean = 42.7 steps/min; 95%CI = 39.6–45.7), followed by the choice condition (mean = 41.0 steps/min; 95%CI = 37.9–44.1), and the fewest steps per minute was observed in the free play condition (mean = 33.4 steps/min; 95%CI= 30.2–36.5). Both the structured no-choice ($p = 0.0003$) and choice ($p = 0.004$) conditions were significantly higher than free play, and although the structured no-choice had more steps/min than structured choice, this difference was not significant ($p > 0.05$).

Percentage of Time in MVPA

Figure 3.2 and Table 3.3 display the differences between instructional conditions with regard to percentage of time in MVPA. The largest percent MVPA was observed in the structured no-choice condition (mean = 30.9%; 95%CI = 28.1–33.8), proceeded by the structured choice condition (mean = 30.8%; 95%CI = 27.9–33.7), and the free play condition (mean = 21.2 steps/min; 95%CI = 18.2–24.1) had the least time in MVPA. Both the structured no-choice ($p < 0.0001$) and choice ($p < 0.0001$) conditions were significantly higher than free play for percentage time in MVPA. There was no significant difference in time spent moderately to

vigorously active in the structured no-choice condition compared to the structured choice condition ($p > 0.05$).

Figure 3.1 Steps per Minute



Error bars indicate 95% CI

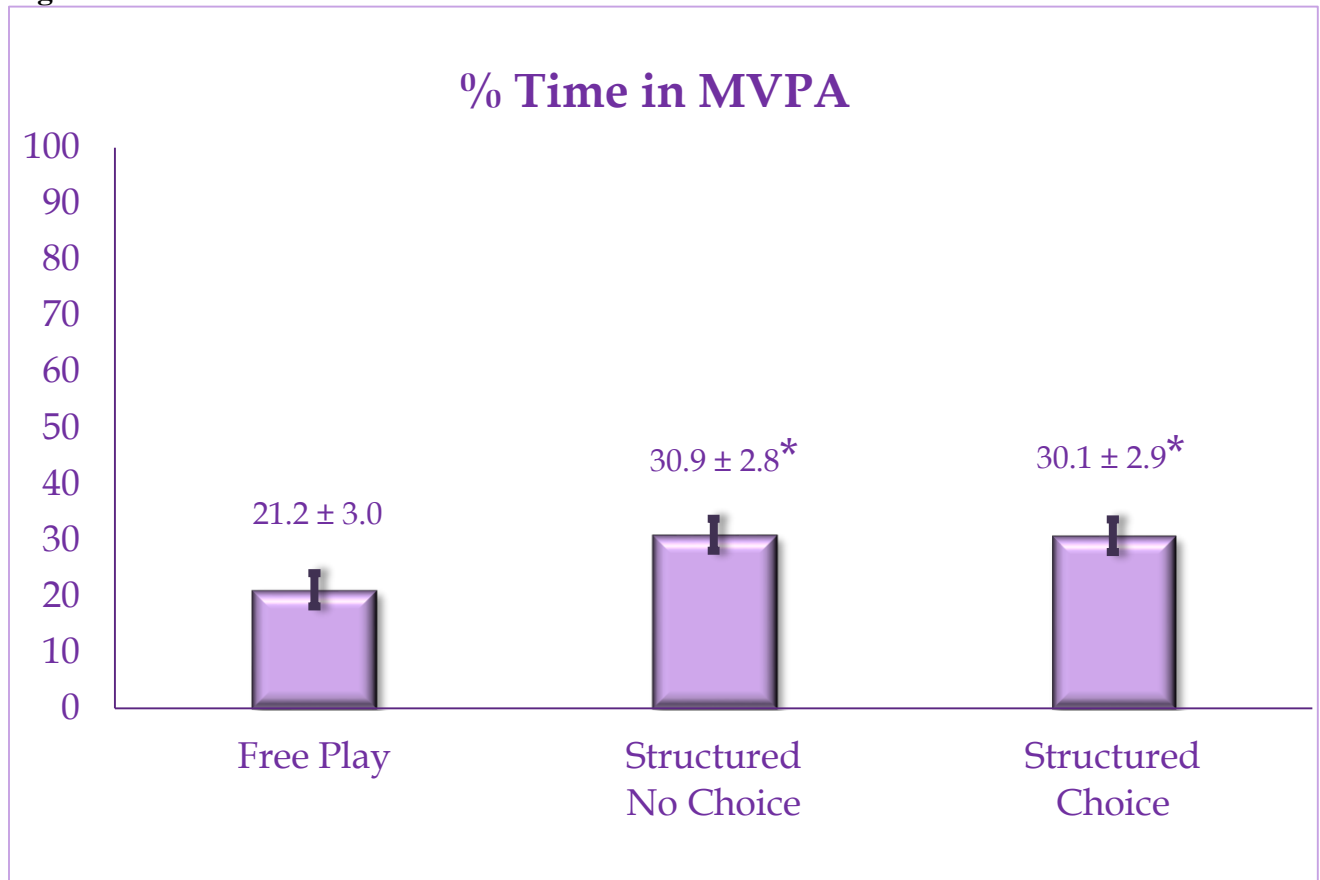
* =Statistically significant difference between structured no choice compared to free-play and choice compared to free-play ($p < 0.05$)

Table 3.2 Steps per minute comparison between intervention conditions
Pairwise comparisons of means with Bonferroni correction (alpha = 0.05)

*** =Statistically significant difference ($p < 0.05$)**

Comparison	Mean	95% CI	<i>t</i>	<i>p</i> -value
Free Play– No Choice	-9.27	-13.49; -5.05	-4.17	0.0003*
Free Play–Choice	-7.63	-12.04; -3.22	3.39	0.004*
Choice – No Choice	-1.64	-6.24; - 2.67	-0.75	1.0

Figure 3.2 Percent time in MVPA



Error bars indicate 95% CI

*** =Statistically significant difference between structured no-choice compared to free-play and structured choice compared to free-play ($p < 0.05$)**

Table 3.3 Percent time in moderate-to-vigorous physical activity (MVPA) comparison between intervention conditions

Pairwise comparison of means with Bonferroni correction (alpha=0.05)

*** =Statistically significant difference ($p<0.05$)**

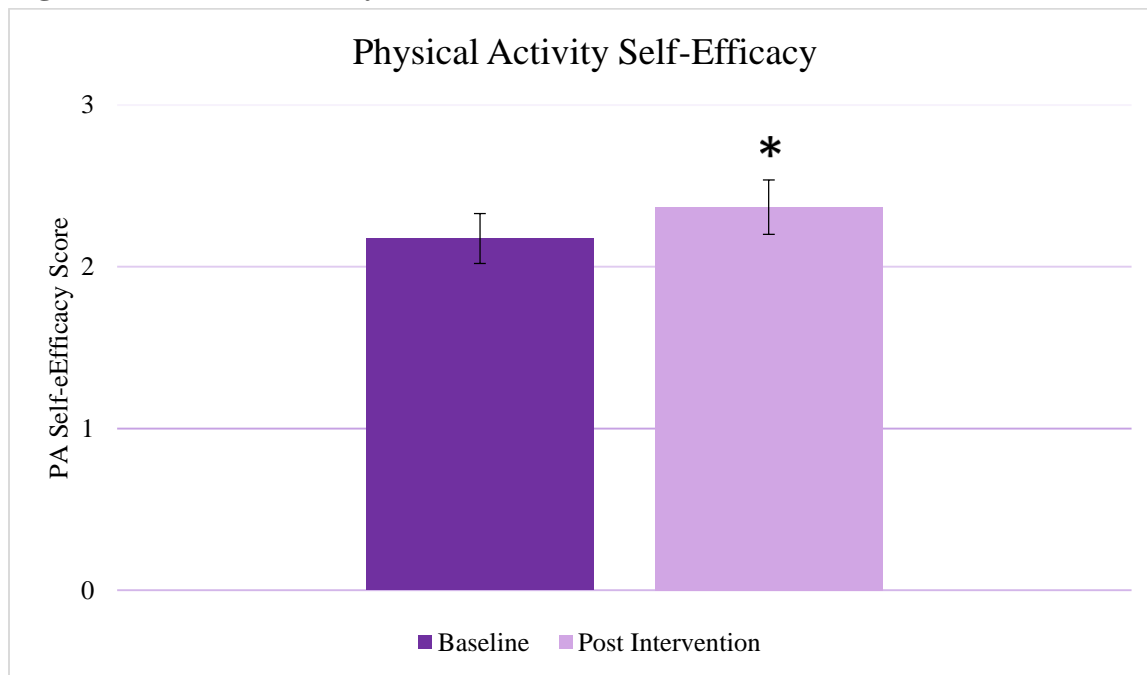
Comparison	Mean	95% CI	<i>t</i>	<i>p</i> -value
Free Play– No Choice	-9.80	-13.74 - -5.86	-4.67	<0.0001*
Free Play–Choice	-9.65	-13.81 - -5.50	-4.55	<0.0001*
Choice – No Choice	-0.15	-4.23 – 3.93	-0.07	1.0

Questionnaires

Physical Activity Self-Efficacy and Enjoyment

The results of the PA self-efficacy questionnaire indicate that there was a statistically significant improvement in self-efficacy over the course of the 3 week intervention. On a scale of 0-3, the baseline self-efficacy mean was 2.17 (95%CI=2.0–2.3) and by the end of the intervention the mean increased to 2.37 (95%CI=2.2–2.5). ($p = 0.002$). PA enjoyment, which was scored on a scale where a low score represented higher enjoyment, also increased from baseline post-intervention (baseline mean=1.77; 95%CI=1.5-2.0) (follow-up mean=1.75;95%CI=1.5-2.0), but this increased enjoyment of PA was not significant ($p=0.688$).

Figure 3.3 PA Self-Efficacy Mean Scores

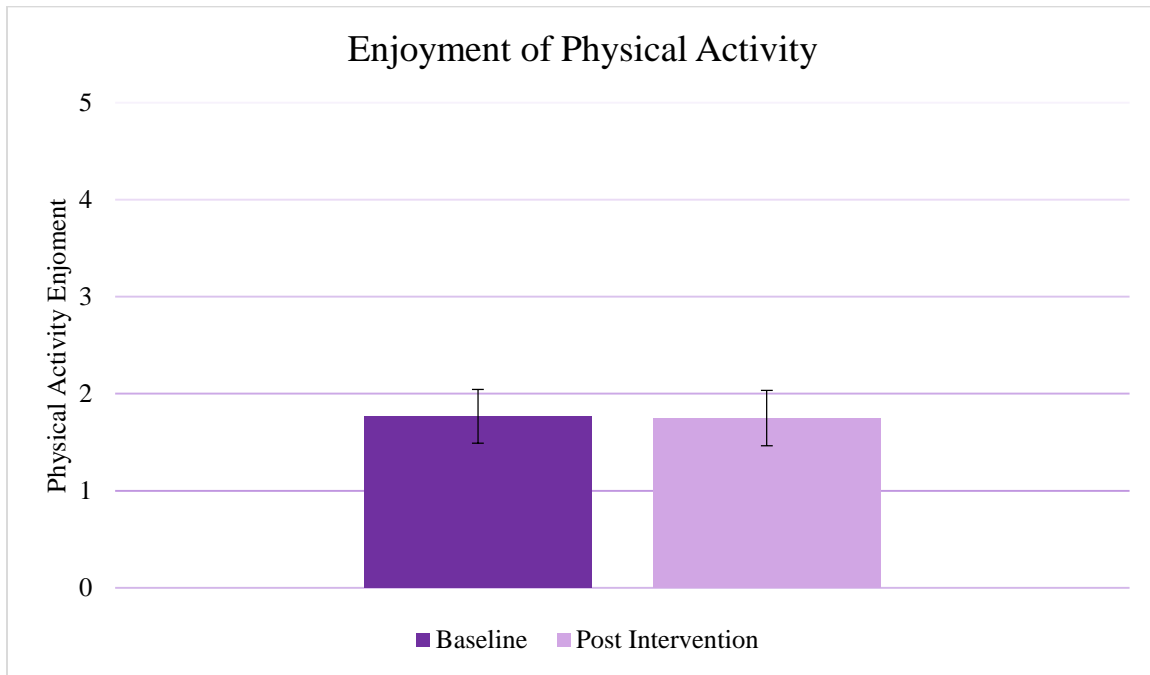


Higher scores indicate higher PA Self-Efficacy

Error bars indicate 95% CI

***=Statistically significant difference between baseline and post-intervention scores ($p < 0.05$)**

Figure 3.4 PA Enjoyment Mean Scores



Lower scores indicate high PA Enjoyment

Error bars indicate 95% CI

SDI, Autonomy, Competence, and Relatedness

From the SIMS and PA motivation questionnaires, the means for each instructional condition could be calculated for SDI, autonomy, competence, and relatedness. Scores for SDI can range from -18 to 18. Autonomy, competence and relatedness scores can range from 1 to 7. The mean scores for each PA motivator differentiated by instructional condition is displayed in table 3.4.

Table 3.4 PA Motivation Measures Descriptive Statistics

Motivation Measure	Condition	N	Mean	Std. Deviation	Minimum	Maximum
SDI	Choice	31	7.01	4.51	-1.78	18.00
	No-Choice	31	6.98	4.91	-1.89	17.67
	Free Play	31	7.05	5.27	-4.33	18.00
Autonomy	Choice	31	4.42	1.18	1.67	6.33
	No-Choice	31	4.45	1.05	2.00	6.17
	Free Play	31	4.74	1.32	1.83	7.00
Competence	Choice	31	5.48	1.04	1.75	7.00
	No-Choice	31	5.36	1.11	2.17	7.00
	Free Play	31	5.71	1.01	3.08	7.00
Relatedness	Choice	31	5.34	1.23	1.73	6.80
	No-Choice	31	5.28	1.27	1.13	7.00
	Free Play	31	5.50	1.1	2.13	7.00

One-Way Repeated Measures ANOVA

The One-way ANOVA compared the effect each instructional condition (choice, no-choice, free play) had on each PA motivation measure (SDI, Autonomy, Competence, Relatedness). The mean score variation between instructional conditions was not significantly different across all PA motivator measures: (SDI mean = 7.02; $F = 0.09$; $p = 0.991$), (Autonomy mean = 4.54; $F = 2.10$; $p = 0.131$), (Competence mean = 5.52; $F = 3.34$; $p = 0.053$), (Relatedness mean = 5.37; $F = 1.41$; $p = 0.251$).

The variation in means for each PA motivation measure was not significantly different for any instructional condition. The accuracy of the F value estimations produced by the repeated measures ANOVA was tested with Mauchly's test of sphericity. SDI, autonomy, and relatedness all met sphericity assumptions, but competence required a Huynh-Feldt correction to make the F-ratio more conservative by reducing the degrees of freedom. Where the overall variance for competence was found to be significantly impacted by instructional condition, the pairwise comparison for competence means for each instructional condition was not found to be significant.

**Table 3.5 PA Motivators Mean Score Comparison between Instructional Conditions
One-Way Repeated Measures ANOVA with Bonferroni Correction (alpha = 0.05)**

Measure	F	Std. Error	Degrees of Freedom	<i>P</i>
SDI	0.09	0.81	2, 30	0.991
Autonomy	2.10	0.19	2, 30	0.131
Competence	3.34	0.17	1.64*, 30	0.053
Relatedness	1.41	0.20	2, 30	0.251

***Huynh-Feldt correction was utilized to adjust degrees of freedom because assumption of sphericity was not met in Mauchly's Test of Sphericity**

Chapter 4 - Discussion

Major Findings

The purpose of this study was to examine the effect that three types of instructional conditions, structured no-choice, structured choice, and free play, had on PA levels in Russian girls at summer camp setting. We hypothesized that the free play condition would elicit the highest levels of PA based on previous literature, however, this was not supported in by results from the current study. Our results showed that this sample of girls spent more time in MVPA and accumulated more steps per minute during structured PA sessions as compared to free-play. A secondary aim of the study was to measure how instructional condition effected PA motivation. The current study revealed that instructional condition did not significantly affect PA motivators: SDI, autonomy, competence, or relatedness.

Physical Activity Findings

A systematic review of health benefits of PA reports that there is strong consistent evidence that in children health benefits are associated averaging at least 2-3 hours per week of MVPA (Janssen 2010). All the girls in the current study accumulated MVPA that contributes to their recommended 2-3 weekly hours. It has also been shown to be beneficial to not only acquire MVPA minutes throughout the day, but to be moderately vigorous physically active in bouts lasting at least 5 minutes in length (Mark 2009). Children generally accumulate the majority of their daily MVPA in intermittent brief instances throughout the day, just a couple minutes from time to time, but PA activity sessions in the current study contributed to girls acquiring more health beneficial, prolonged bouts of MVPA.

Contrary to our hypothesis, free-play sessions resulted in lower levels of activity, both for steps per minute and percent time in MVPA, compared with structured activity sessions. Even when controlling for covariates: week, sport, the same results were found. There was no difference between structured no-choice and structure choice conditions with regard to percentage of time in MVPA or steps per minute. Both structured conditions results regarding percentage of time in MVPA and steps per minute in structured PA sessions fit with current findings in the literature (Guagliano, Lonsdale, Kolt, Rosenkranz, & George, 2015; Trost al., 2008).

Our study's results were also similar to a study done by Chin et al., (2013). In this cross-over study, children who were provided with a variety of cooperative game choices, led by activity session coaches, had significantly higher levels of vigorous activity during recess compared to those without intervention. The games in the program were similar those in our study in that they were inclusive games that allowed everyone to play at once and they also had a non-elimination structure. Also similar to our study, in Chin and colleagues study (2013) there was a choice in activities and there was a group with no instruction at all. The differences between the two studies include that the current study used accelerometers to objectively measure PA, whereas their study used direct observation for measuring PA. Another difference between our two studies was that the Chin et al. study didn't have a cross-over design, The students who were exposed to the recess intervention went to different schools than those who were not exposed to the guided play making it difficult to make any conclusions about the effectiveness of the recess intervention for increasing vigorous PA. The current study, however, is able to make conclusions on the effectiveness of the instructional condition due the participants being exposed to each condition.

Proposed Reasoning for Physical Activity Results

In the current study, our hypothesis regarding PA in free play may not have been supported due to the study procedures. Previous studies that have compared free-play to other instructional conditions, have found PA levels to be the highest in the free-play condition when the alternative instructional conditions were traditional organized group PA (Ajja et al., 2014; Beets et al. 2008; Trost et al., 2008). Traditional structured PA utilizes elimination games and common competitive sports such as basketball, dodgeball, and kickball. These traditional PA session games permit for participants to accumulate sedentary time by not requiring participants to actively participate the whole game by standing in fields, waiting for a turn, and sitting on the sidelines. The structured no-choice and structured choice conditions in the current study, however, may have facilitated more MVPA and steps/min due to encouraging PA and providing engaging games that limited amount of sedentary time. The CATCH games are designed to be non-elimination games that provide participants with the greatest opportunities to be physically active by reducing team size, reducing number of participants per piece of equipment, and by providing simple, clear PA instruction, and improving participant and space management. Other PA intervention studies in children utilizing CATCH activities have shown significant participant PA levels improvements (Coleman et al., 2005; Kelder et al., 2005). CATCH activities have been shown to slow the progression of overweight/obese prevalence in school children (Luepker et al., 1996).

Higher levels of MVPA may also have been observed in structured conditions because study participants may have been motivated to please the PA session's teacher. In order to please the PA session instructors during structured sessions, girls would be required to participate in

activities requiring the girls to be physically active. Lower levels of MVPA and steps/min in the free play condition may also be due to the girls being able to self-select less strenuous activity or non-active activities, and girls who self-select to be inactive in free play sessions have been shown to repeatedly make this selection in free-play conditions (Ajja et al., 2014). Girls in the current study were informally observed sitting more and choosing to talk with friends during the free play PA sessions rather than being physical active. The girls may have been more active throughout the structured sessions due to being encouraged to participate the entire duration of the activity session, and potentially because they were engaged in several new games throughout the session helping to maintain their interest and enjoyment of PA.

There were no significant differences found between the structured choice and structured no-choice conditions in this study, and that may have been due to the conditions being too similar. In both conditions, the girls played the same three games corresponding to the week's theme. In the structured choice condition the girls were given three options and were told when to switch games as in the structured condition. The only difference was that girls in the choice condition could self-select who they played with each game, as well as choose to play the same game. Allowing for more choice in the structured choice conditions, such as more game options or allowing the girls to select how long they played each game, may have produced differences between the structured conditions.

Questionnaire Findings

There have been previous concerns raised in a recent study that girls would be less motivated to be physically active and drop out of PA sessions if MVPA was increased during PA sessions (Guagliano, Lonsdale, Rosenkranz, Kolt, George, 2014). The SDI from the current study as well as Guagliano, Lonsdale, Kolt, et al. (2015) revealed, however, that girls were not

less motivated to be physically active after increasing levels of MVPA. The current study also found that structured instructional conditional improvements to MVPA did not have a significant impact on relatedness, competence, or autonomy. These findings support the assumption that implementing PA intervention techniques that increase MVPA will not negatively affect girls' participation in PA sessions.

The current body of literature indicates physical activity behavior particularly in girls is limited by their PA self-efficacy, or their ability to overcome PA barriers (Tappe, Duda, & Ehrwald, 1989). A previous study has also indicated that self-efficacy can be improved by teaching girls the necessary skills to overcome these barriers (Troost et al. 1996), which may have been an outcome from the current study. The first two days of each week were utilized to teach girls the skills to allow them to competently participate in the PA session games throughout the week. This may help explain the significant improvement in participant PA self-efficacy scores from baseline to post intervention ($p=0.02$). The current study did not find a change in PA enjoyment over the course of the study (baseline to week 3), but this may have been due to PA enjoyment scores already being high at baseline among the participants. The participants mean PA enjoyment score was already 1.7 at baseline which is good because on the questionnaire's scale of 1-5, 1 represents the greatest PA enjoyment score.

PA motivation has been shown to be positively associated with choice, autonomy, and competence (Lonsdale et al., 2013), however, our results indicated no differences in autonomy, competence, and relatedness between PA instructional conditions. The lack of change in relatedness and competence may be interpreted as a good outcome because telling the girls what to do in structured condition sessions didn't negatively affect their motivation to be physically active. They still felt competent in their abilities to be physically active regardless of being told

what to do by a teacher compared to being allowed to make choices in the activity selection. The lack of difference in relatedness scores shows that girls felt as connected to group in making their own choices regarding PA game selection, as when they were told what to do in group setting. This helps support the notion that girls would feel competent in their abilities to make PA selection on their own outside of PA sessions. While there was not a significant difference in autonomy scores between instructional conditions, mean autonomy scores were higher in free play conditions than structured no-choice and structured choice conditions. This is an expected result because girls in free play would be expected to have higher autonomy, freedom over one's actions.

Experimental Considerations

Strengths of Current Study

The current study provides supportive results to studies in the current research literature with regard to PA condition affecting PA levels, PA motivation, and PA self-efficacy. This study is novel in that it is the first PA intervention study looking into the effect of instructional condition on PA levels in girls at a Russian summer camp setting. There are currently a limited amount of PA activity studies in Russian settings, and this study adds to knowledge regarding not only intervening in Russian children's PA levels, but monitoring PA levels of Russian children. A major strength of the study is that the participant retention is high. Only one of the thirty-two girls didn't complete the study; 25 attended all sessions; and 31 attended at least 2 of 3 sessions allowing for their data to be used in all analyses.

Another strength of the study is that its conditions were representative of true-to-life conditions expected at a summer camp. The intervention sessions were set in windows of time that were similar to already designated time segments for PE sessions at the camp, meaning that

the intervention did not interrupt the flow of classes that was already established at the camp. The equipment used in the study was minimal, and besides the flags used to designate which team a girl was on during a game, all equipment utilized in the study was already available for use at the camp. This would allow for the games and techniques for PA instruction to be replicated in future sessions of the camp. Girls would also be available to play these games and utilize the skills they learned in PA sessions on their own time throughout the camp day.

Limitations of Current Study

One major limitation of the study is the sample size. Due to the quantity of activity monitors that were available to transport to Russia, the sample size was limited to 32 girls. This small sample size in a fairly isolated population in Russia also reduces the generalizability of the findings to other populations. Another limitation regarding the sample is that the participants were from a convenience sample rather than a random sample which introduces potential selection bias. An additional bias to the study may also have been due to the “celebrity” effect of the main instructor. Being that setting for this study was done at a camp is fairly isolated part of Russia, girls were not commonly introduced to Americans, making the main researcher of particular interest to girls in the study. The girls showed favoritism to this instructor and many have gone above and beyond typical behavior to please the instructor. Another limitation of the study is the short duration of study. Three weeks is not substantial amount of time to develop new health behaviors regarding PA levels making outcomes only applicable short-term, however still applicable to the usual camp duration in Russia. Despite the limitations, the study was able to use objective measures to rigorously assess the effects of PA instructional conditions on Russian girl’s PA levels. The cross-over design reduced bias by exposing each participant to all conditions allowing for more accurate comparisons of instructional conditions effect on MVPA.

Future Research Directions

Future research should continue to investigate the motivational implications of providing choice on PA. By providing more choice and freedom in PA selection, a greater differentiation between structured choice and structured no-choice conditions may be established, potentially eliciting differences in outcome measures between structured conditions. Future research should continue to investigate the motivational influences for girls to be physically active. The observed drop-off in Russian girls PA levels may not be due to enjoyment of PA, since PA enjoyment was already high among the girls. Future research should also test the PA instructional conditions used in the current study, on a larger sample of children over a longer time frame. Testing these methods on a larger sample would allow for more generalizability of the study's findings. Follow-ups and repeated installments of this study could help determine the long-term effects on outcomes and PA behavior. Testing instructional conditions on boys may also be beneficial to see if instructional conditions effect on PA is similar in all children, or are differentially effective in girls and boys.

Conclusions

As far as we are aware, this is the first PA intervention study done in Russian camp setting. Our study's results provide support to previous literature findings that suggest evidence-based instructional interventions can promote higher PA levels in PE sessions. Although contrary to our primary hypothesis, both types of structured instructional conditions were superior to free play in respect to PA levels. This study provides novel first results in a Russian setting that suggest that a well-planned physical education session can increase short-term physical activity in Russian adolescent girls, relative to a free play session.

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Appendix A - Study Questionnaires

1. Child Questionnaire

Child ID Number _____

Please do not write your name anywhere on this survey.

INSTRUCTIONS: Read this information on physical activity, then answer questions 1-5 by filling in the circle that goes with your answer.

Physical Activity is any activity that increases your breathing and makes your heart beat faster.

Physical Activity can be done in sports, playing with friends, or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, skateboarding, dancing, swimming, soccer, basketball, football, and volleyball.

	Not at all Sure	Somewhat Sure	Very Sure
1. How sure are you that you can do physical activity <u>60 minutes each day</u> ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. How sure are you that you can be physically active <u>no matter how busy your day is</u> ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. How sure are you that you can be physically active <u>no matter how tired you may feel</u> ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. How sure are you that you can be physically active <u>even if it is hot or cold outside</u> ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. How sure are you that you can be physically active <u>even if you have a lot of homework</u> ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



INSTRUCTIONS: In the spaces below, please write your date of birth and your age.

6. What is your date of birth? month: _____ date: _____ year: _____

7. How old are you? _____ (years)

2. Parent Questionnaire

Child ID # _____

1. Your child's gender? Mark one:

<input type="radio"/> Girl	<input type="radio"/> Boy
----------------------------	---------------------------

2. What is your child's date of birth (Month/day/year)?

For example 04/15/1995

--	--	--	--	--	--	--	--	--	--

3. What is the highest level of education completed by the child's parents or guardians? Mark one in each column.

Mother/Female Adult			Father/Male Adult		
Does not apply	<input type="radio"/>		Does not apply	<input type="radio"/>	
Less than high school	<input type="radio"/>		Less than high school	<input type="radio"/>	
High school	<input type="radio"/>		High school	<input type="radio"/>	
Some college	<input type="radio"/>		Some college	<input type="radio"/>	
Graduated college	<input type="radio"/>		Graduated college	<input type="radio"/>	
Graduate degree or above	<input type="radio"/>		Graduate degree or above	<input type="radio"/>	
Don't know/Not sure	<input type="radio"/>		Don't know/Not sure	<input type="radio"/>	

4. How do you describe your child? Select one or more:

Asian	<input type="radio"/>	White	<input type="radio"/>
Black or African Origin	<input type="radio"/>	Other (describe) _____	<input type="radio"/>
Hispanic or Latino	<input type="radio"/>	Don't Know/ Not Sure/ Prefer Not To Answer	<input type="radio"/>

INSTRUCTIONS: For the following questions, think about all the time your child spends in physical activity each day, do not include physical education or gym class. Add up the total time your child spends in physical activity and select an accurate response for each question below. Mark one response:

0	1	2	3	4	5	6	7
days	days	days	days	days	days	days	days

5. Over the past 7 days, on how many days was your child physically active for a total of at least 60 minutes per day?

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

0	1	2	3	4	5	6	7
days	days	days	days	days	days	days	days

6. Over a typical or usual week, on how many days is your child physically active for a total of at least 60 minutes per day?

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

3. Physical Activity Enjoyment Questionnaire

Enjoyment of Physical Activity

INSTRUCTIONS: Read this information on physical activity, then answer all questions by filling in the circle that goes with your answer.

Physical Activity is any activity that increases your breathing and makes your heart beat faster.

Physical Activity can be done in sports, playing with friends, or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, skateboarding, dancing, swimming, soccer, basketball, football, and volleyball.



When I am physically active...

Disagree
a lot

Disagree a
little

Neither
Agree
nor
Disagree

Agree
a little

Agree
a lot

... I feel bored.

☐
☐
☐
☐
☐

... I dislike it.

☐
☐
☐
☐
☐

... it's no fun at all.

☐
☐
☐
☐
☐

... it frustrates me.

☐
☐
☐
☐
☐

... it's not at all
interesting.

☐
☐
☐
☐
☐

... I feel as though I
would rather be doing
something else.

☐
☐
☐
☐
☐

4. Post Activity Session Survey

My Activity Monitor Number (on top of the monitor) _____ My Age (years) _____

Please circle the number that best describes the reasons why you are participating in **today's** lesson.

<i>Why are you participating in <u>today's</u> lesson?</i>	Not at All True			Quite True			Very True
Because I think that this activity is interesting.	1	2	3	4	5	6	7
Because I am doing it for my own good.	1	2	3	4	5	6	7
Because I am supposed to do it.	1	2	3	4	5	6	7
There may be good reasons to do this activity, but personally I don't see any.	1	2	3	4	5	6	7
Because I think that this activity is pleasant.	1	2	3	4	5	6	7
Because I think this activity is good for me.	1	2	3	4	5	6	7
Because it is something that I have to do.	1	2	3	4	5	6	7
I do this activity but I am not sure if it is worth it.	1	2	3	4	5	6	7
Because this activity is fun.	1	2	3	4	5	6	7
I don't know; I don't see what the activity brings me.	1	2	3	4	5	6	7
Because I feel good when doing this activity.	1	2	3	4	5	6	7
Because I believe this activity is important for me.	1	2	3	4	5	6	7
Because I feel that I have to do it.	1	2	3	4	5	6	7
I do this activity, but I am not sure it is a good thing to pursue it.	1	2	3	4	5	6	7

Please circle the number that best describes your teacher's behavior in **today's** lesson.

Remember your teacher will never see your responses.

<i>During <u>today's</u> class...</i>	Not at All True			Quite True			Very True
The teacher gives us choices about how we do the things in today's class.	1	2	3	4	5	6	7
The teacher talks about how we can use things we learn in today's class.	1	2	3	4	5	6	7
The teacher listens to our ideas in today's class.	1	2	3	4	5	6	7
The teacher praises us when we try hard in today's class.	1	2	3	4	5	6	7
It seems like the teacher is always telling us what to do in today's class.	1	2	3	4	5	6	7

PLEASE TURN OVER

Please circle one... Gender: Male or Female

...Were you born in Russia? Yes or No

...Is Russian the main language spoken in your home? Yes or No

During Today's Class...

For each statement, please circle the number that best describes your experience in today's lesson.

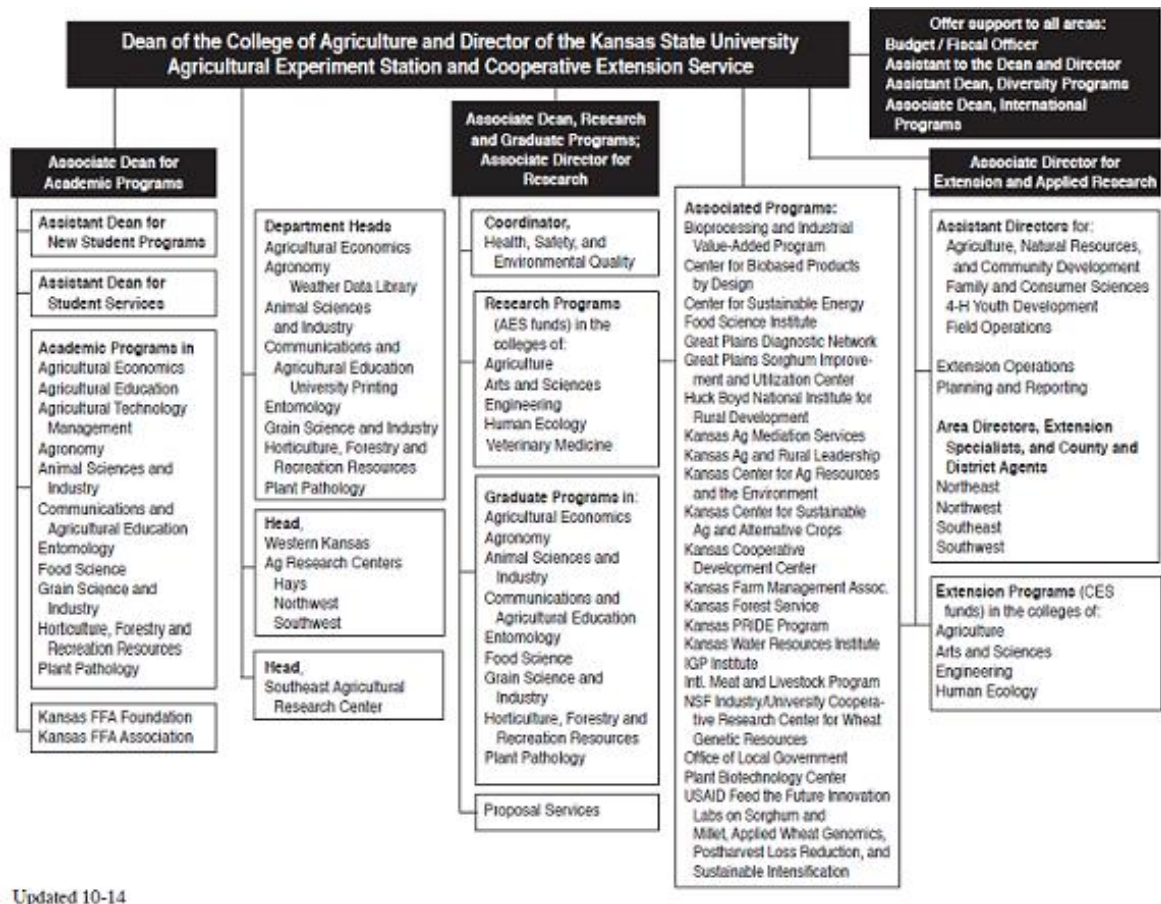
<i>During <u>today's</u> class...</i>	Not at All True			Quite True			Very True
I can decide which activities I want to practice in today's class.	1	2	3	4	5	6	7
I think I am pretty good at today's activities.	1	2	3	4	5	6	7
In today's class, I feel I am pursuing goals that are my own.	1	2	3	4	5	6	7
I feel understood in today's class.	1	2	3	4	5	6	7
I am doing what I want to be doing in today's class.	1	2	3	4	5	6	7
I am satisfied with my performance in today's class.	1	2	3	4	5	6	7
I have some choice in what activities I do in today's class.	1	2	3	4	5	6	7
In today's class I feel listened to.	1	2	3	4	5	6	7
I'm taking part in today's class because I really want to.	1	2	3	4	5	6	7
In today's class I feel supported.	1	2	3	4	5	6	7
I feel pretty competent in today's class.	1	2	3	4	5	6	7
I am participating in this class willingly.	1	2	3	4	5	6	7
I choose to participate in today's class according to my own free will.	1	2	3	4	5	6	7
I am pretty skilled in today's class.	1	2	3	4	5	6	7
I have a say regarding what skills I want to practice in today's class.	1	2	3	4	5	6	7
In today's class I feel safe.	1	2	3	4	5	6	7
I really have a sense of wanting to take part in today's class.	1	2	3	4	5	6	7
In today's class I feel valued.	1	2	3	4	5	6	7
I feel some freedom in choosing what I do in today's class.	1	2	3	4	5	6	7

Chapter 5 - Field Experience Report

Introduction

I completed my field experience at the Riley County Research and Extension office located at 110 Courthouse Plaza Manhattan, KS. The Riley County research and extension office is supported by Kansas State University and through their partnership, they work to encourage the adoption of evidence-based information to improve quality of life in Kansas (Kansas State Research and Extension [KSRE], 2015). The Kansas State University Agricultural Experiment Station and Cooperative Extension is part of a national education network established in 1914 with the intended purpose of extending technical expertise and research findings to help people improve their homes, families, farms, businesses, and communities (Riley, 2015a). Each of Kansas's 105 counties has an Extension Cooperative office. The offices are supported by county, state, federal and private funds as well as land-grant universities. The Kansas State University branch of Research and Extension's mission statement, "Dedicated to a safe, sustainable, competitive food and fiber system and to strong, healthy communities, families, and youth through integrated research, analysis and education" is executed through their partnerships with thousands of volunteers, teachers, community leaders, community organizations, and the Kansas State Colleges of : Agriculture, Arts and Sciences, Engineering, Human Ecology, and Veterinary Medicine (KSRE, 2015). The organizational breakdown of K-State Research and Extension can be viewed in Figure 5.1.

Figure 5.1 Organizational Breakdown of K-State Research and Extension (KSRE, 2015)



Updated 10-14

My time at research and extension began on January 7, 2015 and lasted until April 15, 2015. During this time I completed my required one hundred and eighty hours of experience at the courthouse office as well as other program locations: schools and public buildings in the city of Manhattan. Throughout my time at Riley County Research and Extension, I was supervised by Virginia (Ginny) Barnard, MPH. Ginny, a former Kansas State MPH alumnus, is currently a Riley County Extension agent in Family and Consumer Sciences. As a Family and Consumer Sciences agent she is responsible for developing and implementing educational programs on family issues relevant to nutrition, food safety, parenting, financial management, health and safety, and family and personal relationships (Riley County, 2015b). Ginny has many responsibilities as a member of

various coalitions and committees as well as the director of many health and wellness programs, and she allowed me to attend and work on some of these projects throughout my field experience. I was assigned to two major programs and several secondary programs to work on while at Extension; DIET FREE, a healthful lifestyle adoption program, and Manhattan Parks and Recreation youth basketball sports nutrition education programs were my two major programs. My secondary roles were to assist Ginny in youth yoga sessions, to guest lecture at the county employee “Lunch and Learn” series, and to attend monthly Flint Hills Wellness Coalition meetings.

Learning Objectives

Before starting my field experience at Riley County Research and Extension, I worked with Ginny to develop learning objectives to accomplish throughout my time field experience that would pertain to my degree program and emphasis. My first object was to gain a deeper understanding of the motivations/barriers for adults wanting to make healthy behavior changes. This objective was reached in my DIET FREE classes where barriers to making health behaviors changes were identified and discussed by participants in class. I saw that people who really wanted to make changes still struggled, even with the extra support of the group. The discussion of how the weekly homework went from the previous week was also enlightening in regard to identifying real life barriers and struggles participants had adapting new health habits into their lives.

The second learning objective was to learn what established social norms, traditions, and environmental factors influence an individual’s ability to increase physical activity and improve access to healthy foods. This objective was reached through both my DIET FREE class as well as my youth basketball sessions. On the DIET FREE side, participants identified work policies like work meetings or break rooms that had donuts or cakes that made making health diet choices more difficult. Other participants identified environmental factors such as lack of space to or expense to work out regularly. Since we live in the Midwest and DIET FREE classes were during the winter,

many participants said they didn't want to buy a gym membership, but the weather limited their ability to exercise outside. However, Zonya's program included workouts that didn't require extra equipment and could be done in the home. This learning objective was also highlighted at sports nutrition sessions. Here many kids reported not eating before practice, or just eating junk before, during, and after basketball games. The kids helped come up with suggestions to improve their dietary choices, like not drinking soda during games, as well as asking parents to bring healthier snack options to basketball games. Having the kids discuss options to overcome their own dietary barriers was an engaging learning experience for both myself and the athletes.

The third objective: Learn what internal/external rewards adults may need to successfully change health behaviors was achieved during the DIET FREE sessions. During class it was emphasized to stop using food as positive reinforcement for adopting a beneficial health behavior. An example of this would be to buy yourself a new shirt after exercising daily for a whole week, rather than reward yourself with a piece of cheesecake. I think the share and tell portion before class was also a good opportunity for class participants to be rewarded with praise for successfully accomplishing lifestyle modification behaviors. The group support was beneficial to all those involved for both providing suggestions regarding what worked for them on their homework, as well in providing positive support and encouragement throughout the ten weeks.

The fourth objective was to understand how community partners/organizations work together to impact access to healthy foods and support physical activity. I think this objective was most relevant to the Flint Hills Wellness Coalition meetings I attended. In these sessions I saw representatives from seemingly unrelated groups in the community work together to improve health environments and policies throughout Manhattan. An example was that the food service representative provided her experience with working with vending machine vendors to improve the nutritional quality of products to hospital and K-State representatives in order to help them make

similar changes to their work places. I also observed all of these members as well as representatives from Fort Riley and the courthouse working together to design tobacco-free signs to help improve PA environments like parks. This same group also worked together to discuss bike path improvements, and possible strategies to improve nutritional quality at Parks and Recreation baseball concessions.

The last learning objective identified prior to my field experience was to learn about the scope of work of K-State Research & Extension, and this was accomplished throughout the many programs and meetings I was able to attend throughout my Spring semester at Riley County Research and Extension, as well as through my background research for this report on Research and Extension.

Focus and Scope of Work

I worked along with another student to design nutrition education sessions for Parks and Rec youth basketball. The sessions were designed to be interactive and engaging, as well as short enough that they would not interrupt too much practice time. The program consisted of three nutrition education sessions that were administered in 15-minute sessions, either before or after team practices, depending on the coach's preference. Ginny also had me jump into being an assistant coach to the DIET FREE healthy lifestyle development program my first week of my field experience. My primary role was to assist in running weekly classes and to be available to answer participants' questions over material covered in that week's class. I also assisted and worked with and other health promotion groups to develop and provide additional health and wellness related programs throughout the community during my time at Kansas State research and Extension.

DIET FREE

DIET FREE is a 10-week community-wide health and wellness promotion program that encourages the adoption of healthful nutrition and physical activity habits into daily life. Research Extension purchased the DIET FREE health and wellness program and offered the course to the general public, for a fee, to cover course materials. The program was developed by Registered Dietitian and Certified Fitness Instructor, Zonya Foco, who received her bachelor's degree from Eastern Michigan and worked in clinical nutrition for eight years at the Michigan Heart and Vascular Institute at St. Joseph Mercy Hospital. The program consists of a weekly lecture that focuses on one of the 8 core health habits that create her DIET FREE acronym: 1) drink water, 2) include breakfast and commit to fit, 3) eat often and include a fruit or vegetable every time, 4) tame your sweet tooth, 5) find the fat (learn types of dietary fats), 6) replace processed foods with wholesome, 7) eat until no longer hungry, 8) and exercise every day. Zonya advocates living a diet-free life through coaching support for physical activity, healthy eating, and maintenance strategies.

Each week focused one of the previously listed health habits and the curriculum provided homework to help participants make behavior changes. Examples of homework were tracking screen time, or cutting out processed food from their refrigerator. In addition to Zonya's seminar, I developed and presented an additional interactive demonstrations, lasting about fifteen minutes that would immediately follow the weekly video seminar. The additional presentation was rooted in that week's new health habit and required me to cook something or develop models and handouts to help demonstrate or emphasized the health habit of interest. This class also required me to administer and assess pre- and post-program questionnaires regarding health habits and healthy lifestyle behavior knowledge.

The World Health Organization has reported that 1.4 billion adults aged 20 or more are overweight in the world (World Health Organization [WHO], 2013) and that 38 million deaths

globally can be attributed to non-communicable diseases (WHO, 2015). Dietary and physical activity behaviors have been shown to be significant risk factors for non-communicable diseases (WHO, 2015; Wang and Beydoun., 2007), which makes programs like Zonya's appealing to people struggling with chronic disease. The importance of PA and dietary interventions is supported by a systematic review done by Curioni and Lourenco (2005) that found the most successful long-term weight loss programs were those that included both diet and PA modifications. Although not rigorously evaluated for effectiveness, Zonya's program emphasizes adopting healthful eating behaviors and physical activity habits for weight loss and improving general health and wellness.

The dietary aspects of the program she focuses on are drinking mostly water, reducing added sugar in the diet, and increased consumption of lean protein, fruits and vegetable, and whole grains. The program also provides her cookbook "Lickety Split Meals" which was published by the American Diabetes Association to help program participants reach new dietary goals by cooking more healthful meals at home. Zonya's program also provides a workout video for at-home exercising, led by a certified fitness instructor to help people at all levels make PA a regular part of their day. Her handbook also provides suggestions to help move more throughout the day, like parking your car farther away, using the stairs more often, being more active while doing generally sedentary activities like leg raises while brushing your teeth, or arm circles while watching TV. By offering this program, Riley County is impacting public health by providing health and wellness education. This program received a lot of positive feedback and many of the participants reported enjoying the support group aspect of the program. As a wellness coach, I informally observed a lot of motivation to make healthy lifestyle behavior changes. It also provided me with a better perspective of how support groups can be really beneficial for those trying to make behavior changes. The participants in the class even gave out contact information and discussed making a

group Facebook page at the conclusion of the class to continue to support one another with their health goals.

Manhattan Parks and Rec. Youth Basketball Sports Nutrition Education

The second of the major program I worked on was sports nutrition education for Manhattan Parks and Recreation, which I selected based on my interest and previous experience working on health behavior interventions in children. I started my intervention planning process by having an initial meeting with representatives from Parks and Recreation. In the meeting they communicated their need for nutrition education in their youth sport teams, and youth basketball was selected as the intervention group based on which sport was in season during my time at Research and Extension. The health sessions were designed to provide evidence-based material related to optimal athletic performance and health of the athlete. Since the participants of the study were 10-12 years of age, nutrition is of particular importance because the child is still developing and growing (Cotugna, Vickery, & McBee 2005; Meyer, O'Connor, & Shirreffs, 2007). It is important that youth athletes meet increased nutrient demands due to higher energy expenditure from exercise to maintain general health, and optimize growth and athletic performance (Meyer et al., 2007; Petrie, Stover, & Horswill, 2004). Adequate nutrition in child athletes is also essential for preventing injuries such as stress fractures (Petrie et al., 2004). In addition to the youth athletes, this program also had the opportunity to improve coaches' and parents' sports nutrition education since many of the nutrition sessions in this program were held in the presence of the athletes' coaches and parents. Cotugna et al. (2005) found that many athletes and their advisors were misinformed and had misconceptions about nutrition knowledge. Improving this gap in knowledge could have implications for improving athlete health and performance. Another major goal of the sports nutrition education sessions was to teach the importance for proper hydration in regard to athletic performance and athlete health. Even dehydration levels of as little as 2% can have negative impacts

on heart rate, temperature regulation, and heart or lung function, which can all impact athletic performance (Rosenkranz, 2014b). Children are also especially susceptible to thermoregulatory problems due to their increase surface area to weight ratio causing them to absorb heat from the environment more efficiently, as well as lower sweat rates limiting their cooling abilities (Meyers et al., 2007).

Additional Projects

In addition to these two projects I attended three “Lunch and Learn Sessions,” held City Hall in Manhattan, KS. These sessions were held to provide city employees with health and wellness promoting knowledge. I presented on lifetime fitness and chronic disease prevention at one of these sessions, as well as led a PA stretching routine for 20 minutes after the lunch. I also developed and distributed an exercise sheet with descriptions of the exercises I lead after lecture. I also accompanied Ginny and participated at weekly after school yoga sessions during February and March at Theodore Roosevelt Elementary School. I also was exposed to committee procedures during my time at Flint Hills Wellness Coalition meetings. The Flint Wellness Coalition is a community health promotion group, whose vision statement is “to create a healthier community for our residents through policy, system, environmental, and personal change (Riley County, 2015a).” At these meetings, I observed and took part in the meeting discussions regarding planning, implementing, and assessing health and wellness initiatives and policies in the community.

Activities Performed

DIET FREE

I was required to attend the 10 weekly two hour sessions. My primary role was to assist Ginny in teaching the weekly class, but my first task each week was to set up the class’s snacks, beverages, and set up weekly handouts and class activities. I then started the class by having

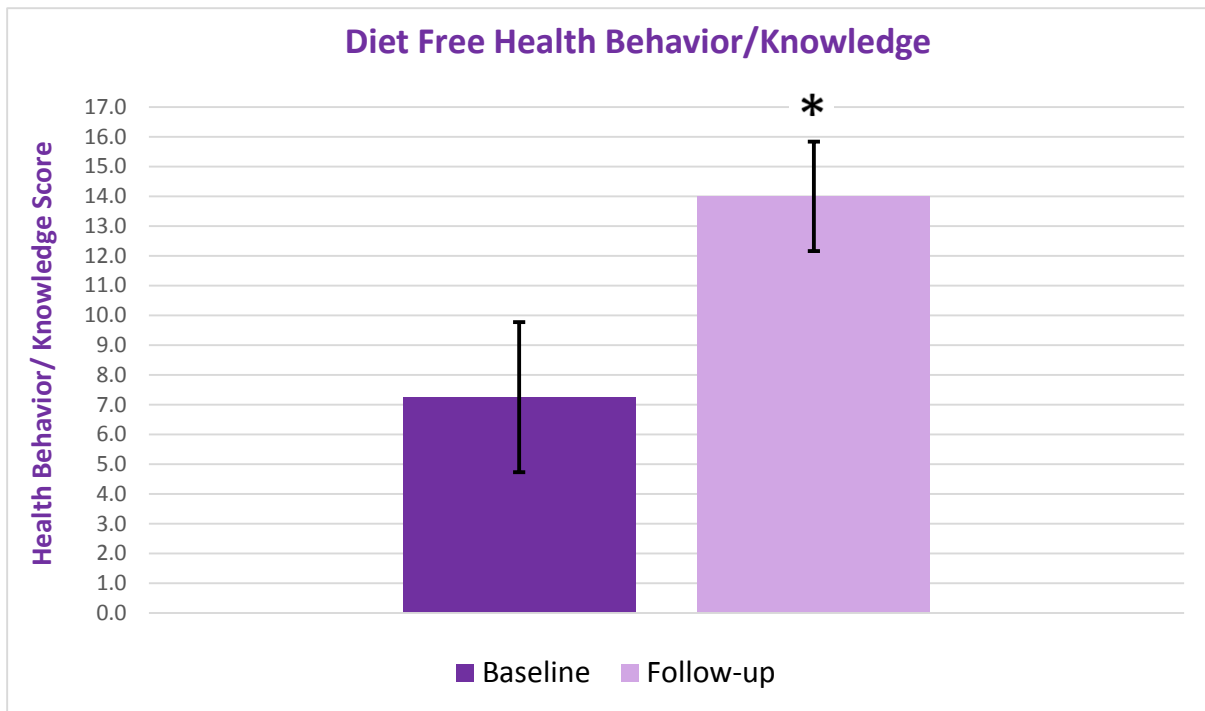
participants discuss their previous week's homework and share their successes and challenges in adapting the previous week's health habit into their daily routine. During this time I answered any questions the program participants had regarding class material and provided feedback on their homework.

After the first session which was utilized to introduce the program and handout course materials (DIET FREE lifestyle guide and habit tracker, Lickety-Split Meals Cookbook, Water for Lemons health habit adoption novel, Everyday Fitness: movement training DVD, DIET FREE audio tape, the 10 DIET FREE online video seminars, and the DIET FREE tote bag and wristband reminder). After the initial discussion, I helped lead the group through the video seminar and paused to allow participants time to jot down notes, ask questions, and participate in interactive parts of Zonya's seminar. After the 20-30 video portion, we again discussed any further questions and went over the week's homework assignment.

For the last 15 minutes of the class, I led the group through an interactive additional activity. We developed and presented an additional activity that related to the health habit of emphasis in that particular class. Some of the extra class activities I developed were: presentations and examples of healthier alternatives, the presentation of healthy meal and snack options from Zonya's Lickety-Split meal Cookbook, as well as providing interactive games for program participants. The games featured The Price is Right style games that incorporated topics in class such as serving size versus portion size and glycemic index versus glycemic load portions. We also had them put "price tags" on their guess for how many grams of sugar were in popular sugar-sweetened beverage options and so-called healthy grocery store food selections. I also helped present on the difference between emotional and physical hunger, and administered questionnaires to help identify binge eating behaviors in participants.

I was also in charge of administering, collecting, and analyzing the pre- and post-program questionnaires. Of the 20 participants who registered for the program, about 13-15 were in attendance regularly on Thursday night sessions. However, out of the 20 participants who filled out the initial self-assessment questionnaires, only 8 filled out and handed in post assessment forms. Low participation in the last session may have been due to the last session just being a social event to share experience and healthy recipes. For statistical analysis, paired t-test (significance was set at $p < 0.05$) were run to assess differences pre- and post-program participation. The results showed that there was a statistically significant improvement in nutrition knowledge from baseline to post-intervention ($t = 6.67, df = 7, p < 0.001$). Every participant had a higher health knowledge and behavior score post- DIET FREE. Although this was a significant change pre- to post-intervention, the strength of the conclusions that can be from the result are limited due to the lack of using an evidence-based, validated assessment tool and due to the lack of a comparison group.

Figure 5.2 Diet Free Mean Health Behavior/Knowledge



Higher scores indicate better health behavior/knowledge in participants

Error bars indicate 95% CI

***Statistically significant difference between baseline and follow-up health behavior/knowledge scores ($p < 0.05$)**

Parks and Recreation Sports Nutrition Education

My first task after deciding to implement a youth basketball sports nutrition program, was to recruit teams and coaches to participate in the program. A fellow student and I then designed flyers to recruit coaches and emailed across the Parks and Recreation Coaches' list serve. Flyers were designed promoting a multiple session sports nutrition education opportunity that would provide information for healthier athletes and better athletic performance. Scheduling of teams for their first session began the following week.

Each session had a sports nutrition related theme, and we were responsible for designing handouts using evidence-based materials relevant to that session's topic. Materials from Iowa State Outreach department (Litchfield, Westberg, & Metcalf, 2012; Litchfield, Westberg, & Lasley, 2012) as well as material from K-State Nutrition and Exercise lectures (Rosenkranz 2014a, 2014b) were used in the development of all the session handouts. These handouts can be found in figures 5.5-5.7. All the flyers provided simple easy to follow recommendations for optimal sports nutrition as well as food and beverage suggestions at different phases of athletic participation and preparation. Through each session we lead the team through the session handout, allowed them to ask questions and then we quizzed them on what they learned through games. The last few minutes of the session were designated for distributing the snack that was relevant to that session's recommendations e.g., chocolate milk and oranges.

We were also responsible for designing a questionnaire to assess the coaches and youth basketball athletes. The coaches' questionnaire asked questions regarding their own nutrition knowledge as well about their perception of the importance and need for sports nutrition education. It also acquired some demographic information about the coaches and their previous coaching experience. The student athlete questionnaires were designed to assess nutrition knowledge and were administered pre- and post-intervention.

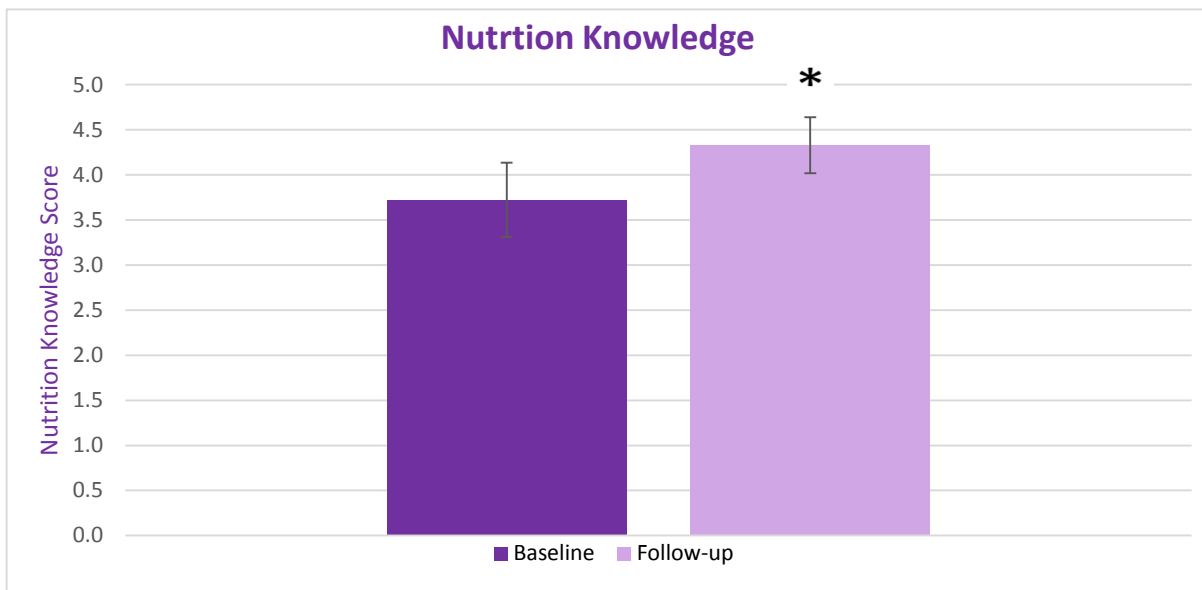
Coaches Questionnaires

A total of 8 coaches filled out the pre-education session coaching questionnaires. The mean age of the coaches was 37.3y (SD = 12.4), all were classified as Caucasian, and all but two were male. Seven of the 8 coaches had previous coaching experience and all but one of the coaches went through the National Youth Sport Coaching Association Training provided through Manhattan Parks and Recreation. Most of the coaches had no formal nutrition education, with two reporting education from a dietitian or health professional and one reporting nutrition education from a university. The surveys also provided an opportunity for coaches to report what information they wanted to know, or would be most beneficial for their athletes to learn. The coaches wanted to know more about beneficial pre- and post-game snacks, proper hydration information, and nutrition for concentration and endurance in their athletes.

Athlete Questionnaires

Of the 6 teams that started the intervention, only 3 teams completed all of the three nutrition education sessions. Reasons for drop-out were primarily due to scheduling problems due to coaches canceling practice for illness or inclement weather (i.e., snow). However, one team just didn't follow up, and stopped responding to emails regarding future sessions. For one team of seven boys, the average age was 11.6 yrs. (SD = 0.8 years); one team of six girls mean age was 10.8 (SD = 1.0 years) and for another team of 6 girls the mean age was 10.5 (SD = 0.9 years). A paired t-test was run to assess the difference in nutrition knowledge from baseline to follow up (significance was set at $p < 0.05$). There was a significant improvement from baseline to post intervention ($t = -4.652$, $df = 18$, $p < 0.001$). Results are displayed in Figure 5.3.

Figure 5.3 Youth Basketball Mean Nutrition Knowledge Score



Higher scores indicate better knowledge in participants

Error bars indicate 95% CI

***Statistically significant difference between baseline and follow-up knowledge scores ($p < 0.05$)**

Other Programs

As mentioned above, I also attended monthly Flint Hills Wellness Coalition meetings. At the meetings I was also required to present updates on the progress of the of the Parks and Recreation youth basketball sports nutrition education program, as well as provide an assessment of how successful I thought the program was, following its conclusion. I also took part in discussions regarding implanting policy change to offer more nutritious food selections at Parks and Recreation baseball concessions. In addition to attending Coalition meetings, I also took part in Manhattan city employees' "Lunch and Learn" health and wellness promotion seminars, as well as weekly youth yoga sessions at Theodore Roosevelt Elementary School. At one of the four "Lunch and Learn" programs I was required to lead the lecture for the day. I prepared a 25-minute seminar on lifetime fitness and chronic disease prevention using evidence- based materials. After the presentation, I distributed handouts that I made with key points and lifestyle recommendations, based on the populations throughout the world that have the longest lifespan and highest quality of life. Following my seminar, I led the group through exercises that could be used for a warm-up and cool-down routine for physical activity. I then distributed the flyers I developed, that had the list of exercises performed in the session, as well as a description of how to perform them properly.

Products Developed

For the DIET FREE program, I developed handouts for static and dynamic stretching routines that explained their importance, as well as gave instruction on how to accurately perform the stretches to reap the most benefit and prevent injury. I used similar handouts for the exercise session I led after the "Lunch and Learn" session where I presented. I also developed several handouts throughout the DIET FREE program that provided resources pertinent to DIET FREE habits, as well as recipes for food I prepared for class, and outlets for physical activity such as a community race schedule throughout the spring.

For the youth basketball sports nutrition program, I initially helped to design flyers to help recruit teams to participate in our program (Figure 5.4). While developing the flyers, I learned the importance of providing simple straightforward information in a visually appealing format. I also learned how important clarity is, since there was some confusion from a coach about the duration of our program based on the information provided on the flyer. Overall, the flyer was a good form of promotion in order to quickly spread recruitment information over the coach list server. I also had to develop handouts for the athletes to take home for each nutrition education session. I used similar techniques in their design and in providing age appropriate simple information for the athletes and their parents regarding sports nutrition. I utilized materials developed by the “eat to Compete” program out of the Iowa State University Extension Outreach office (Litchfield, Westberg, & Metcalf, 2012; Litchfield, Westberg, & Lasley, 2012), as well as lecture materials (Rosenkranz, 2014a, 2014b) to provide nutrition information regarding improving health and athletic performance through improved nutritional practice. The three flyers developed for sports nutrition education sessions are shown in Figures 5.5–5.7.

Figure 5.4 Youth Basketball Sports Nutrition Recruitment Flyer



SPORTS NUTRITION FOR OPTIMAL ATHLETIC PERFORMANCE

If you and your team are willing to participate, contact either Natalie or Natasha to get more information and set a practice for a session



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**10-15 minute
session at practice**

Discussion Topics:

- Importance of Proper Hydration
- Fueling for Practice and Competition
- Significance of Protein and Carbohydrate Consumption for Athletic Performance and Recovery

Activities:

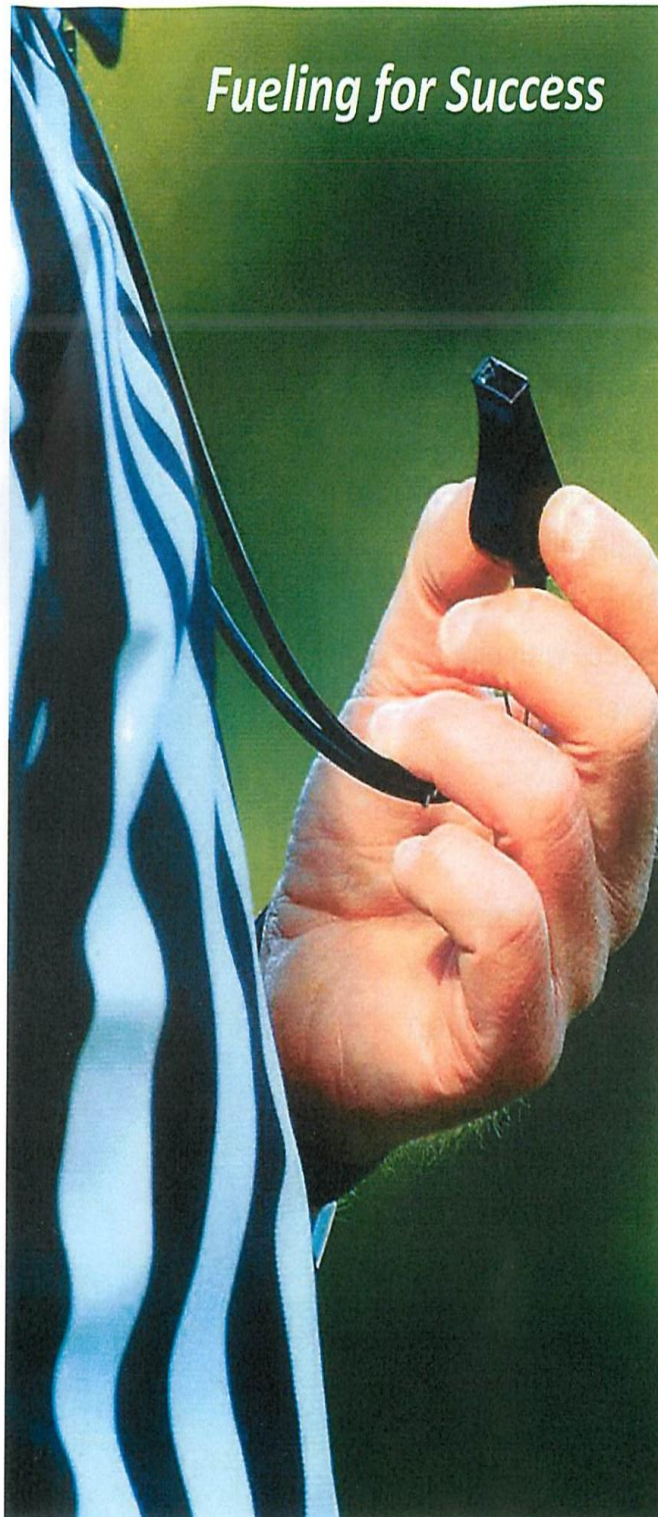
- Prepare Healthy Snacks for Athletes
- Play Games and Activities

INSTRUCTION BY

Kansas State University
Master's in Public Health
Nutrition Students

Natalie Updyke
natalieu@ksu.edu
(660)349-0824
Natasha Rodicheva
nrodicheva@ksu.edu
(785)200-7084

Figure 5.5 Youth Basketball Nutrition Session 1: Pre-Competition and Practice



Do

Day Before: Do consume:

- plenty of complex carbs (whole grains, veggies, and fruits)
- moderate source of low-fat protein

3 to 4 hours before: Do consume meal/snack:

- high in complex carbs
- moderate in protein
- low in fat

Immediately before: Do consume low calorie snack with high-carbohydrate and low -protein

Don't

Day Before: Don't consume:

- foods with little nutritional value (fast food, highly processed foods, sodas, etc.)

3 to 4 hours before: Don't consume meal/snack:

- high in fat
- simple carbohydrates
- with new foods

Immediately before: Don't consume:

- high fiber foods
- high fat foods

Carbohydrates

Your body stores carbohydrates as glycogen, which is quickly available to use as fuel. Carbohydrate consumption during high-intensity competition can prevent muscle glycogen depletion and can improve performance.

Protein

Your protein needs can easily be met if you are eating enough food from a balanced diet, and you avoid empty calories (foods that are high in added sugars and/or solid fats with little nutritional value).

Fat

You need fat in your diet, so do not try to eliminate it completely. Instead, incorporate omega-3 fat containing foods like fatty fish (tuna, salmon), walnuts, and flaxseeds into your diet. This type of fat is heart healthy and prevents inflammation. Olive and canola oil, or foods containing them, are also monounsaturated fat that is heart healthy.

≥ 3-4 hours pregame

meal ideas:

- Low-fat sandwiches with whole grain bread/rolls
- Beans (black, pinto, kidney, garbanzo)
- Lean meat (turkey, chicken, pork) or fish
- Baked potatoes with veggies and cheese
- Pasta (preferably whole grain)
- Rice (preferably whole grain)
- Hummus or peanut butter with whole grain bread
- Fruits, vegetables, salads

Pregame/practice snack

ideas:

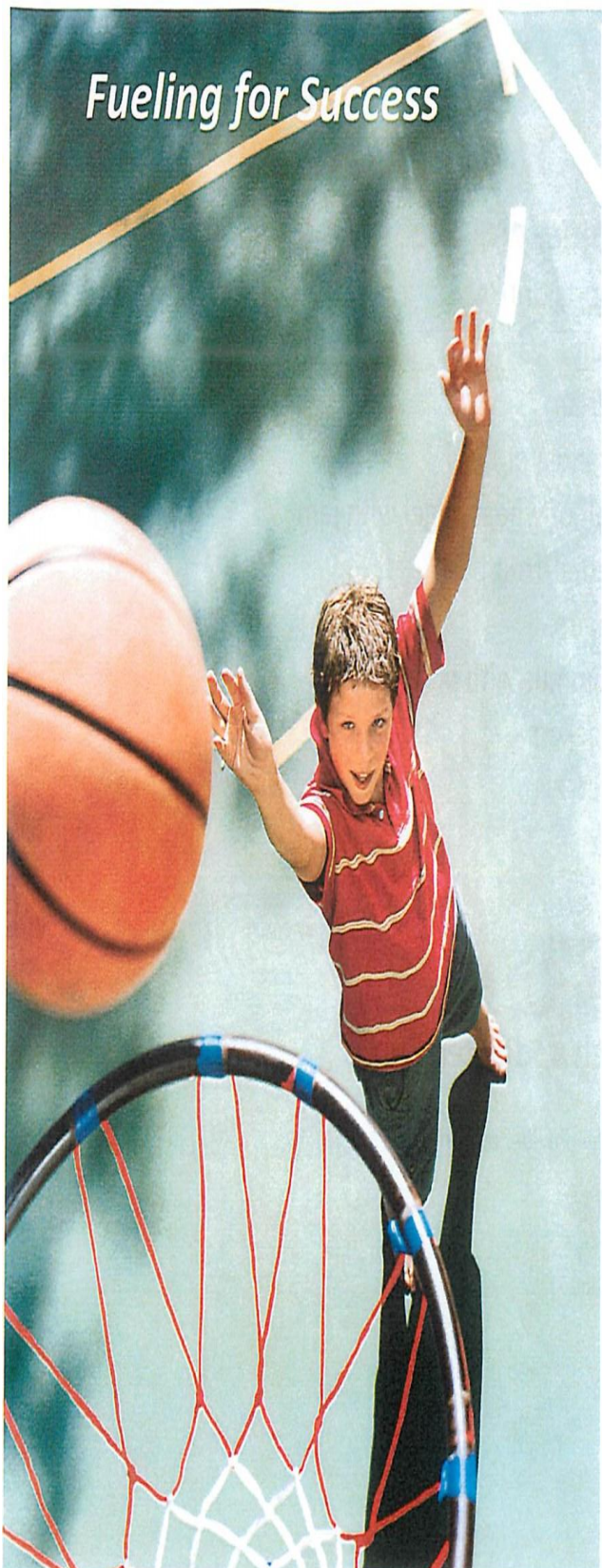
- Sports drinks
- Fruit
- Cereal
- Granola or bar
- Half of wheat bagel with jam
- Cereal/fruit bar
- Yogurt
- Hummus with pita
- Crackers
- Pretzels



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Figure 5.6 Youth Basketball Nutrition Session 2: Post Competition and Practice



Do

Within 15 minutes: Do consume:

- liquid carbohydrate
- juice, milk, and sports drink as needed

Within 2 hours: Do consume meal/snack:

- high in carbohydrate, preferably complex carbs
- moderate in protein
- low in fat
- pasta with lean meat, chocolate milk

Why

- carbohydrate will help to restore glycogen in muscles
- reduce fatigue/ low energy level
- protein will help your muscles recover and grow stronger
- combination of protein and carbs helps to optimize glycogen replacement

Glycogen

- an energy storage molecule in your muscles
- composed of glucose molecules
- is an easily available source of energy for your muscles during exercise
- within an hour after exercise your body is most efficient in producing glycogen

Benefits of Post-Exercise Meal

- improved recovery
- reduced soreness
- improved immune function
- improved bone strength and density
- improved body fat utilization



≥ 3-4 hours post-practice postgame/practice snack

meal ideas:

- Low-fat sandwiches with whole grain bread/rolls
- Beans (black, pinto, kidney, garbanzo)
- Lean meat (turkey, chicken, pork) or fish
- Baked potatoes with veggies and cheese
- Pasta (preferably whole grain)
- Rice (preferably whole grain)
- Hummus or peanut butter with whole grain bread
- Fruits, vegetables, salads

ideas:

- Sports drinks
- Fruit
- Cereal
- Granola or bar
- Half of wheat bagel with jam
- Cereal/fruit bar
- Yogurt
- Hummus with pita
- Crackers
- Pretzels



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Figure 5.7 Youth Basketball Nutrition Session 3: Hydration



Estimate sweat rate:

1. weight before training –weight after training=total weight loss
2. fluid consumed during exercise (15oz=1 lb)
3. (total weight loss during training+ weight of fluid consumed)/total hours of training=sweat rate

Replace 150% of fluids lost per hour.

Recommended serving sizes

Low-fat chocolate milk=6oz

100% fruit juice=4oz

Gatorade=8oz

Before Practice/Game:

- 2-3 hours before drink 12-16oz water (about 1-1½ standard bottles)
- 10-15 min before drink 5-8 oz water (about 1/2 standard bottle)

Benefits of Hydrating

- Water helps regulate body temperature which could prevent headaches, nausea, and exhaustion
- Water prevents muscle cramps
- Water helps with nutrient transport and waste removal in the body

During Practice:

- Use thirst as an indicator for drinking
- Take drinks during breaks (5 oz)

Effects of Dehydration

- Even small level of dehydration (1-2%) can have negative impacts on heart rate, core temperature, heart and lung function
- In extreme cases dehydration can increase risk of kidney failure

After Practice:

- Immediately afterwards, replace fluids lost during exercise
- For every pound lost during exercise consume 24 oz

Key Points

- **WATER** is the best fluid, especially if the practice/game lasts less than one hour
- **Pre-hydrating** before completion can decrease risk of dehydration during the game
- Consuming dilute carbohydrate solution before and after exercise can increase fluid absorption (=19g per 8oz)
- Consuming beverages with sodium and/or salted snacks with water can help retain fluid (50-170mg per 8oz)
- Consuming a whole 20 oz Gatorade is not necessary
 - An 8oz serving will adequately replace ions lost during a 1 hour game or practice



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Alignment with Public Health Core Competencies

Throughout the extent of my field experience at Riley County Research and Extension and thesis research, I applied all of the core competencies of Public health. Biostatistics, the first core competency, was used in my analyses for both my extension program's data, and my thesis research data. I learned a lot from my biostatistics class and thesis data analyses, which helped me understand when to use different types of measurement tools, as well as understand what statistical tests to use on the appropriate data. With the knowledge I gained from those two experiences, I was able to design and adapt questionnaires to assess Manhattan Parks and Rec youth basketball nutrition education sessions from my physical activity and nutrition research experience as part of my K-State public health education. I analyzed participant questionnaires that assessed health behavior and knowledge change pre- to post-program participation. Although the questionnaires were not a validated tool, they were useful in providing some measure of how health behavior and knowledge scores changed over the course of the program for each individual and for the group as a whole. I also used the survey method to assess youth basketball nutrition knowledge of youth basketball athletes and coaches prior to nutrition education and post nutrition education sessions.

The second core competency, environmental health, was of particular significance in my health promotion presentation regarding lifetime fitness and chronic disease prevention. In the seminar we talked about the importance of assessing, preventing and controlling environmental hazards that pose risk to employees and community members. The importance of creating policies and guidelines in the work place and throughout the community to encourage the most healthful outcomes was also highlighted in the presentation. Another portion of my field experience that environmental health was a key, was in the Flint Hills Wellness Coalition meetings I attended. Two reoccurring topics in the meetings were measures to take in order to make Manhattan public areas tobacco free, and ways improve Manhattan's walkability. The bicycle advising committee is

working to make the environment safer for community members to walk and bike to work, school, and shopping centers. Improving the safety of the trail and sidewalk network has the potential to allow citizens to make healthier commuting and exercise choices, in addition to preventing pedestrian injuries. The tobacco free initiative is trying to encourage eliminating tobacco use in parks and has funding to post signs in public places to identify the area as a tobacco free zones. The importance of reducing health risk due to in environmental conditions was apparent throughout my field experience.

Epidemiology, the third core competency was an integral part of my background research for both my field experience and thesis. Epidemiological literature was useful in helping identify public health risk factors and for identifying potential strategies to improve upon health behaviors for a public health impact in the community. I also used the epidemiological ethical and legal principles for data collection and analysis. Previous epidemiological literature helped me design an ethical study procedure that would allow me to investigate public health questions regarding physical activity and nutrition because of their potential for improving health outcomes. Epidemiological literature also helped me design questionnaires to appropriately assess a public health question, in my case it was in regard to nutrition and physical activity and how they affect participants' health. My epidemiological education and research also helped me identify and understand the limitations and biases in my field experience and thesis data that limited the magnitude of the conclusions I could make from my results.

Health care administration, the fourth core competency was a pertinent in my time at the Research and Extension office. I was able to take part in and observe discussions in Flint Hills Wellness Coalition meetings regarding the policy processes for improving the health status of populations. I was able to see how healthcare organizations, in this case, the town hospital representatives could promote policies and provide services that impact the community's public

health. An example of this would be discussing how to improve the cafeteria meals, vending options, beverage availability in health care establishments. I was able to observe and learn about all the steps that go into implementing a new health promotion policy: writing a proposal, getting administration approval, and working with other community organizations and vendors to implement a new policy. The policies and services that health care providers enact, play a large role in health promotion, disease prevention, and treatment in a community. However, in my time at Research and Extension, I came to understand that while healthcare professionals play an integral part in improving and maintaining public health in a community, many other organizations, employees, businesses, and individuals have to work together to provide access to high quality cost-effective healthcare services necessary for high quality health care. I also was able to see first-hand how health promotion programs offered by Riley County play a role in community health education through health behavior coaching, information seminars, and youth PA sessions.

The last of the 5 public health core competencies is social and behavioral sciences, which identifies and investigates the social and behavioral factors that influence population and individual health. I used literature from social and behavior sciences in both my thesis research and field experience throughout the whole process of designing interventions. I identified at-risk populations for a negative health risk or outcome, the needs in these populations, and then measures that could be taken to improve upon these health outcomes and risk. In my thesis research and nutrition education portion of my field experience I used evidence-based approaches to intervene in nutrition and PA health behaviors that could potentially improve desired health outcomes in participants. Through education opportunities in my field experience, I was also able to help people identify health risk in their own lives, and then provide opportunities and resources to help reduce or improve upon these risks. Social and behavioral sciences was especially integral in the DIET FREE class, where we provided recipes and samples, went through PA routines, and provided strategies

for improving upon health behaviors in the participants' daily lives. This competency was important throughout the extent of my time at Research and Extension as well as during my thesis research, because understanding the social and behavioral influences on health helped me to design and implement all of the public health programs as well influence my use of the other four competencies.

Conclusions

I consider my public health education as both an extremely valuable and enlightening experience. I was exposed to numerous opportunities that allowed me to grow and develop as a researcher and public health promoter, and I am motivated to continue working to better understand factors to improve health outcomes in all people. I think a major benefit I gained from the program was a better understanding of research methods, especially the importance of using evidence-based methods in health behavior interventions, as well as program and policy implementation. After going through the public health program, I now view health and wellness as a much larger picture than just individual health outcomes and behaviors. Through the program I also gained a frame of reference for the complexity involved in making a public health gains, and was able see how much effort and work goes into making even seemingly small health and wellness improvements.

Although I certainly still have more to learn, the people who mentored, advised, and educated me during my time at K-State provided me with strong public health background, and I am confident that that the skills, knowledge and experience I gained through my program will continue to help me in my pursuit of becoming a valuable health professional.

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Appendix B - Youth Basketball Questionnaires

Figure 5.8 Youth Basketball Child Questionnaire

Name _____ Team _____

Age _____ Gender M / F Date _____

1. How often do you usually do the following?

Tick one box in each row

	Never/rarely OR Less than once/week	About 1-3 times/week	About 4-6 times/week	Every day
	1	2	3	4
a. Drink water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Drink fruit juice or fruit juice drink	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Drink soda (not including diet soda)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Carry a water bottle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Eat chocolate or candy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. French fries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Eat potato chips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Eat fast food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Help choose or buy groceries for the family	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Help prepare your dinner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Eat dinner with most of the family	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Eat dinner in front of the television	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Eat snacks in front of the television	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How many serves of vegetables do you usually eat each day?
[1 serving = 1 cup of salad vegetables, OR ½ a cup of cooked vegetables, OR 1 medium potato]

- ☐ I don't eat vegetables
- ☐ Less than 1 serve a day
- ☐ 1-2 serves a day
- ☐ 3-5 serves a day
- ☐ More than 5 serves a day

3. How many serves of fruit do you usually eat each day?
[1 serving = 1 medium piece, OR 2 small pieces of fruit e.g. clementine ("Cutie") or apricots, OR 1 cup of diced pieces]

- ☐ I don't eat vegetables
- ☐ Less than 1 serve a day
- ☐ 1-2 serves a day
- ☐ 3-5 serves a day
- ☐ More than 5 serves a day

How many servings of fruit do you think we should eat per day? _____

How many servings of vegetables do you think we should eat per day? _____

1. How beneficial is being properly hydrated for you athletic performance?(Select one)	
Not beneficial at all	<input type="radio"/>
Not very beneficial	<input type="radio"/>
Somewhat beneficial	<input type="radio"/>
Beneficial	<input type="radio"/>
Very beneficial	<input type="radio"/>
Completely beneficial	<input type="radio"/>
2. How beneficial is maintaining a healthy diet for you athletic performance?(Select one)	
Not beneficial at all	<input type="radio"/>
Not very beneficial	<input type="radio"/>
Somewhat beneficial	<input type="radio"/>
Beneficial	<input type="radio"/>
Very beneficial	<input type="radio"/>
Completely beneficial	<input type="radio"/>
3. How beneficial is eating throughout the day (before practice/game) for you athletic performance?(Select one)	
Not beneficial at all	<input type="radio"/>
Not very beneficial	<input type="radio"/>
Somewhat beneficial	<input type="radio"/>
Beneficial	<input type="radio"/>
Very beneficial	<input type="radio"/>
Completely beneficial	<input type="radio"/>
4. How beneficial is eating after practice/game for recovery and future athletic performance?(Select one)	
Not beneficial at all	<input type="radio"/>
Not very beneficial	<input type="radio"/>
Somewhat beneficial	<input type="radio"/>
Beneficial	<input type="radio"/>
Very beneficial	<input type="radio"/>
Completely beneficial	<input type="radio"/>

Figure 5.9 Youth Basketball Coach Questionnaire

Youth Coaching Survey

INSTRUCTIONS: Please read all the questions carefully.
 Name/Team _____

1. What is your age? _____ years

2. I describe myself as: (Select one)

Male	<input type="radio"/>
Female	<input type="radio"/>

3. I describe myself as: (Select one)

Coach	<input type="radio"/>
Assistant Coach	<input type="radio"/>
Other	<input type="radio"/>

4. I describe myself as: (Select one or more)

Hispanic or Latino	<input type="radio"/>
American Indian or Alaska Native	<input type="radio"/>
Asian	<input type="radio"/>
Black or African American	<input type="radio"/>
Native Hawaiian or Other Pacific Islander	<input type="radio"/>
White	<input type="radio"/>
Don't know/not sure	<input type="radio"/>
Prefer to not answer	<input type="radio"/>

5. Highest level of education completed: (Select one)

Less than high school	<input type="radio"/>
High school	<input type="radio"/>
Some college or associates degree	<input type="radio"/>
Graduated college	<input type="radio"/>
Master's degree or above	<input type="radio"/>
Prefer to not answer	<input type="radio"/>

6. Do you have any previous experience coaching? (Select one or more)

Coached basketball at least once before	<input type="radio"/>
Coached for a competitive, non-school program at least once before (e.g., Club teams)	<input type="radio"/>
Coached for a school program at least once before	<input type="radio"/>
Coached for a recreational, non-school program at least once before (e.g., Parks and Recreation)	<input type="radio"/>
No previous experience	<input type="radio"/>

7. Do you have any coaching-specific training? (Select one or more for each)

Participant ID # _____

Degree related to coaching (Physical Education, Exercise Science, Kinesiology, etc.)	<input type="radio"/>
Coaching certification(s)	<input type="radio"/>
Coaching workshop(s)	<input type="radio"/>
National Youth Sport Coaching Association training (provided through Manhattan Parks and Recreation)	<input type="radio"/>
No coaching-specific training	<input type="radio"/>

8. Do you have any past experience in sport? (Select one or more)

Participation in organized basketball	<input type="radio"/>
Participation in competitive organized sport (School affiliated, club teams, etc.)	<input type="radio"/>
Participation in recreational organized sport (city leagues, company leagues, intramurals, etc.)	<input type="radio"/>
Participation in unorganized sport (pick-up games, etc.)	<input type="radio"/>
No past participation	<input type="radio"/>

9. What is your primary reason for being a youth sport coach? (Select one)

My own child(ren) enrolled in the program	<input type="radio"/>
Volunteer experience	<input type="radio"/>
Enjoyment of coaching	<input type="radio"/>
Asked to volunteer	<input type="radio"/>
Don't know/not sure	<input type="radio"/>
Prefer to not answer	<input type="radio"/>

10. I have had previous formal nutrition education..... (Select one)

From a Dietician/Health Professional	<input type="radio"/>
During a Clinic/Conference/Workshop	<input type="radio"/>
From a University	<input type="radio"/>
I've never had formal nutrition education	<input type="radio"/>
Other(specify) _____	<input type="radio"/>

11. How confident are you in your sports nutrition knowledge? (Select one)

Not confident at all	<input type="radio"/>
Not very confident	<input type="radio"/>
Somewhat confident	<input type="radio"/>
Confident	<input type="radio"/>
Very confident	<input type="radio"/>
Completely confident	<input type="radio"/>

Participant ID # _____

12. How confident are you in your health-oriented nutrition knowledge? (Select one)	
Not confident at all	<input type="radio"/>
Not very confident	<input type="radio"/>
Somewhat confident	<input type="radio"/>
Confident	<input type="radio"/>
Very confident	<input type="radio"/>
Completely confident	<input type="radio"/>

13. How beneficial do you think teaching your athletes about nutrition for better performance would be? (Select one)	
Not beneficial at all	<input type="radio"/>
Not very beneficial	<input type="radio"/>
Somewhat beneficial	<input type="radio"/>
Beneficial	<input type="radio"/>
Very beneficial	<input type="radio"/>
Completely beneficial	<input type="radio"/>

14. How beneficial do you think teaching your athletes about nutrition for better health would be? (Select one)	
Not beneficial at all	<input type="radio"/>
Not very beneficial	<input type="radio"/>
Somewhat beneficial	<input type="radio"/>
Beneficial	<input type="radio"/>
Very beneficial	<input type="radio"/>
Completely beneficial	<input type="radio"/>

15. How beneficial do you think teaching your athletes about avoiding injury would be? (Select one)	
Not beneficial at all	<input type="radio"/>
Not very beneficial	<input type="radio"/>
Somewhat beneficial	<input type="radio"/>
Beneficial	<input type="radio"/>
Very beneficial	<input type="radio"/>
Completely beneficial	<input type="radio"/>

16. How beneficial do you think teaching your athletes about home-based fitness programs would be? (Select one)	
Not beneficial at all	<input type="radio"/>
Not very beneficial	<input type="radio"/>
Somewhat beneficial	<input type="radio"/>
Beneficial	<input type="radio"/>
Very beneficial	<input type="radio"/>
Completely beneficial	<input type="radio"/>

Participant ID # _____

17. What information about nutrition would you like to know? (hydration, snacks, pre/post workout, etc.)

18. What aspects of nutrition and health could be improved at practices and games?

19. Any other comments on these topics?

Participant ID # _____